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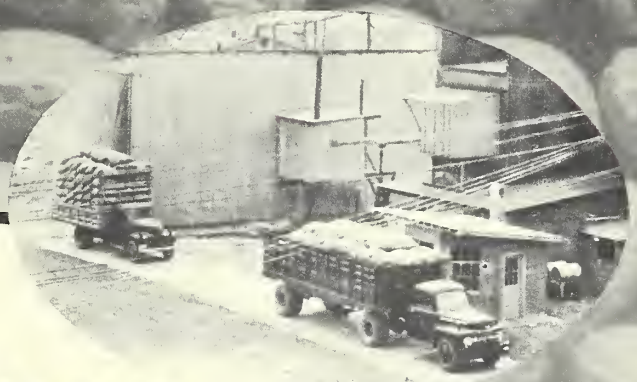

Storage... ... in MARKETING FARMERS' STOCK PEANUTS

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By
Donald B. Agnew
and
Donald Jackson

AGRICULTURAL MARKETING SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

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PREFACE

A major part of the peanut marketing data analyzed and reported here was developed under three marketing research contracts. The Department of Agriculture contracted in 1951 with the agricultural experiment stations of Virginia, Alabama, and Texas to collect and summarize information on methods, practices, and costs in the storage of peanuts, with emphasis on farmers' stock peanuts. The field work was coordinated by A. M. Rollefson of Agricultural Marketing Service. The reports received under the contracts have been integrated and supplemented by additional information and analysis under the direction of C. B. Gilliland, Head, Special Crops Section, Market Organization and Costs Branch, of the Marketing Research Division. As a result, the report represents a composite of the findings and judgments of the organizations and persons responsible for (1) developing the project, (2) carrying out the contract studies, and (3) completing and coordinating the analyses and findings. The persons who carried out the principal tasks under the contracts were: In Alabama, Dr. Joseph H. Yeager; in Texas, William C. MacArthur, agricultural economist; and in Virginia, Professor Harry M. Love.

Many of the data utilized were furnished by the Growers Peanut Cooperative, Franklin, Va.; the GFA Association, Camilla, Ga.; and the Southwestern Peanut Growers' Association, Gorman, Tex. Various firms buying, storing, or processing peanuts or engaged in commercial warehousing gave valuable cooperation in the form of information and consultation. The Peanut Journal and Nut World, Suffolk, Va., contributed the cover photograph of farmers' stock bagged peanuts arriving at a buyer's warehouse.

The study on which this report is based was conducted under authority of the Agricultural Marketing Act of 1946 (RMA, Title II).

* * *

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SUMMARY

One characteristic of the marketing of peanuts is the holding of a large volume of storage stocks through most of the marketing season. Analysis of peanut storage for ways to minimize costs and losses can contribute to lower cost peanut marketing and to improved quality in the peanut products available to consumers.

In this study, the principal factors affecting the cost and efficiency of storage in marketing farmers' stock and shelled peanuts were analyzed, with emphasis on farmers' stock. Farmers' stock peanuts are the unshelled and unsorted crop, whether owned by farmers or by others.

An annual saving of $500,000 appears reasonable as a goal for improved practices in storing and handling farmers' stock peanuts at plants of first buyers--shellers, crushers, and "other" dealers. It is conservatively estimated that savings of this amount could be achieved through (1) the adoption by all buyers of farmers' stock peanuts of methods and practices as efficient as the average of the top one-third, (2) reduction in shrinkage (loss of weight) by as little as one-twelfth, by adopting practices and equipment that would reduce damage in handling the peanuts into and out of storage and by improved rodent and insect control, and (3) reduction to 2 percent, from present levels of 4 percent or more, in the foreign material content of peanuts delivered to first buyers.

The estimated half-million-dollar annual saving takes no account of possible savings through farm storage. At present the average monthly stocks of peanuts stored at plants of first buyers are only one-third to one-half of the seasonal peak storage stocks. Any farm storage would reduce peak market stocks and storage capacity required, and would thereby contribute to more efficient utilization of buyers' storage.

Whether farm storage would pay well enough to encourage the widespread adoption of that practice depends, in part, on the amount and year-after-year consistency of price increases after harvest. Since removal of wartime price controls, farm prices have shown little seasonal variation. Commencing with the 1952 crop, however, the Federal price-support program was modified in such a way that open-market peanut prices were free to rise or fall, relative to the support price, in response to changing market supply and demand conditions. During the 20 years of relatively free markets commencing with 1920, farmers' returns from peanuts could have been increased in many years by an average of 15 to 20 percent through timely marketing, by storing their peanuts to take advantage of seasonal price increases from harvest to late winter.

Any widespread adoption of peanut storage as a producers' marketing practice will depend, of course, on the net returns from storage; that is, on seasonal price increases sufficient to cover all costs and yield a profit. An important consideration is the availability of information with respect to the control of storage costs and losses. There has been little farm storage on which to base such cost estimates. Commercial operating data show, however, that for the usual storage period of 3 to 5 months the cost of peanut storage at buyers' warehouses, excluding shrinkage, averaged about $6 per ton for 20 firms in the Southeast and about $9 per ton for 20 firms in the Southwest. (Corresponding data were not available for the Virginia-Carolina area.) Storage cost varied with size of operation, length of storage, degree to which storage facilities were utilized, efficiency of handling methods and equipment, amount of shrinkage, and extent of loss in market grade.

Fixed costs--costs that total the same amount for a storage facility regardless of the volume stored--amounted to roughly 10 to 15 percent of total storage and handling cost. Of the variable costs as reported here, interest and insurance cost on the stored peanuts averaged from one-half to three-fifths of total storage and handling cost, varying with the value of the peanuts, length of storage, and the interest and insurance rates.

The cost for handling the peanuts into and out of storage amounted to about 10 to 20 percent of total storage and handling cost. Handling cost averaged $1.80 per ton for

bagged peanuts in the Southwest, 67 cents per ton-less than half-as much for bulk peanuts in the Southeast. Bulk handling cost varied from about 50 cents per ton for pneumatic unloaders and portable elevators, to about 80 cents per ton for permanently installed truck dumps and bucket elevators.

Cost of shrinkage of stored peanuts is here considered separately from cost of storage and handling. For Runner peanuts in the Southeast, shrinkage cost averaged one-sixth less than storage and handling cost; for Spanish peanuts, shrinkage cost averaged one-fifth more than storage and handling cost in both the Southeast and Southwest. Based on other data, estimated shrinkage cost for Virginia peanuts would appear to average much less than storage and handling cost, with storage costs in line with those for the Southeast and Southwest.

Over a 5-year period, the physical shrinkage in handling peanuts throughout an entire season ranged from about one-half of one percent to 9 percent. For three seasons, physical shrinkage averaged about half as much for buyers who did not process the peanuts (principally cooperatives) as for all buyers, both in the Southeast and Southwest. Shrinkage was found to vary greatly among the three areas, probably largely because of differences in harvesting, curing, and handling practices. The least amount for each season was found in the Virginia-Carolina area.

As peanuts move through marketing channels between farmers and consumers, utilization of space becomes less of a problem and maintenance of quality more difficult. Costs resulting from losses and inefficient utilization of space are important problems for first buyers. The length of time farmers' stock peanuts are stored is limited by warm-weather problems, largely rancidity and insect damage. But shelling does not solve this problem. Shelled peanuts, more susceptible to rancidity and insect damage than unshelled peanuts, require cold storage with its higher cost. Therefore, a major portion of the peanut supply is held as farmers' stock through most of the season. Consequently, the problem of reducing the cost of storage, including the risk of deterioration, is primarily the responsibility of the first buyers, who hold the peanuts mostly as farmers' stock.

STORAGE IN MARKETING FARMERS' STOCK PEANUTS

By Donald B. Agnew and Donald Jackson,
agricultural economists, Agricultural Marketing Service

INTRODUCTION

Peanuts compete, in their principal use as food, with other nuts, candy, spreads, sandwich fillers, and such snack items as popcorn and potato chips. Along the marketing channel, the peanuts to supply this use must be stored until needed, for the crop is harvested in the fall but the peanuts and peanut products are consumed more or less uniformly throughout the year. If peanuts are to maintain their competitive position, their storage, as well as their production and processing, must be accomplished in the most efficient and economical manner possible. This is important to many of the 150,000 farmers who grow peanuts for the market; each of the two peanut crops, 1951 and 1952, brought farmers about 150 million dollars. Among cash crops in several southern States the farm value of peanuts was surpassed only by cotton and tobacco.

The principal factors affecting the cost and efficiency of storage in marketing peanuts include: (1) Location, volume, and comparative cost of storage for farmers' stock and shelled peanuts; (2) the adequacy of storage capacity at plants of shellers, crushers, and other first buyers of peanuts; (3) storage practices, storage losses and changes in the market quality of the stored peanuts, whether shelled or unshelled; and (4) feasibility and possible market advantages of storage as a growers' marketing practice.

Peanut first buyers (shellers, crushers, and "other" buyers) and "end users" (manufacturers of consumer products) store the market stocks of peanuts and peanut products. The peanuts are stored as "farmers' stock" until milled; after milling are held as cleaned ("roasting stock") or shelled peanuts, usually at consumer-product manufacturing centers, or as "oil stock" at shellers or crushing plants. But very few growers store the peanuts they produce. Whether storage by growers on the farm, or in commercial warehouses, might offer many peanut farmers the opportunity to increase their earnings, and whether it might contribute to increasing the efficiency of buyers' operations, are important questions for processors, dealers, and growers.

The need for cash to repay production loans in the fall, and the high short-term interest rates that farmers had to pay in borrowing money from customary sources to finance storage, appear no longer to be the major deterrents to farm storage that they once were. But the negligible amount of storage by farmers suggests the existence of other limiting factors. Important deterrents seem to be associated with the structure and customs of the market, and the problem of reducing their effect or terminating them requires an analysis of the whole peanut marketing system.

The three main types of peanuts--Virginia, Runner, and Spanish--are marketed separately by growers as farmers' stock (unshelled and unsorted) peanuts; they usually contain some sticks, leafy trash, pebbles, and sand. The farmers' stock peanuts are cleaned or shelled before being shipped to the end users for manufacture into such consumer products as peanut butter, roasted and salted peanuts, nut mixes, and candy. In recent years, peanut butter has accounted for about half of the edible-peanut consumption in the United States. For many years excess peanuts have found an outlet as crushing stock for edible oil, but, in recent years, nearly all good quality peanuts have gone directly into food products. Consequently, processors who supply the consumer market are distributed somewhat like the U. S. population, principally in a number of metropolitan areas. In contrast, peanut production is concentrated in three limited areas--the Virginia-Carolina, southeastern, and southwestern peanut-producing areas (fig. 1).

Farmers market most of their peanuts during a 2-month period following harvest and field curing. The shellers, crushers, and other dealers then store the peanuts as farmers' stock for periods ranging generally from 3 to 8 months. Thus, farmers' stock

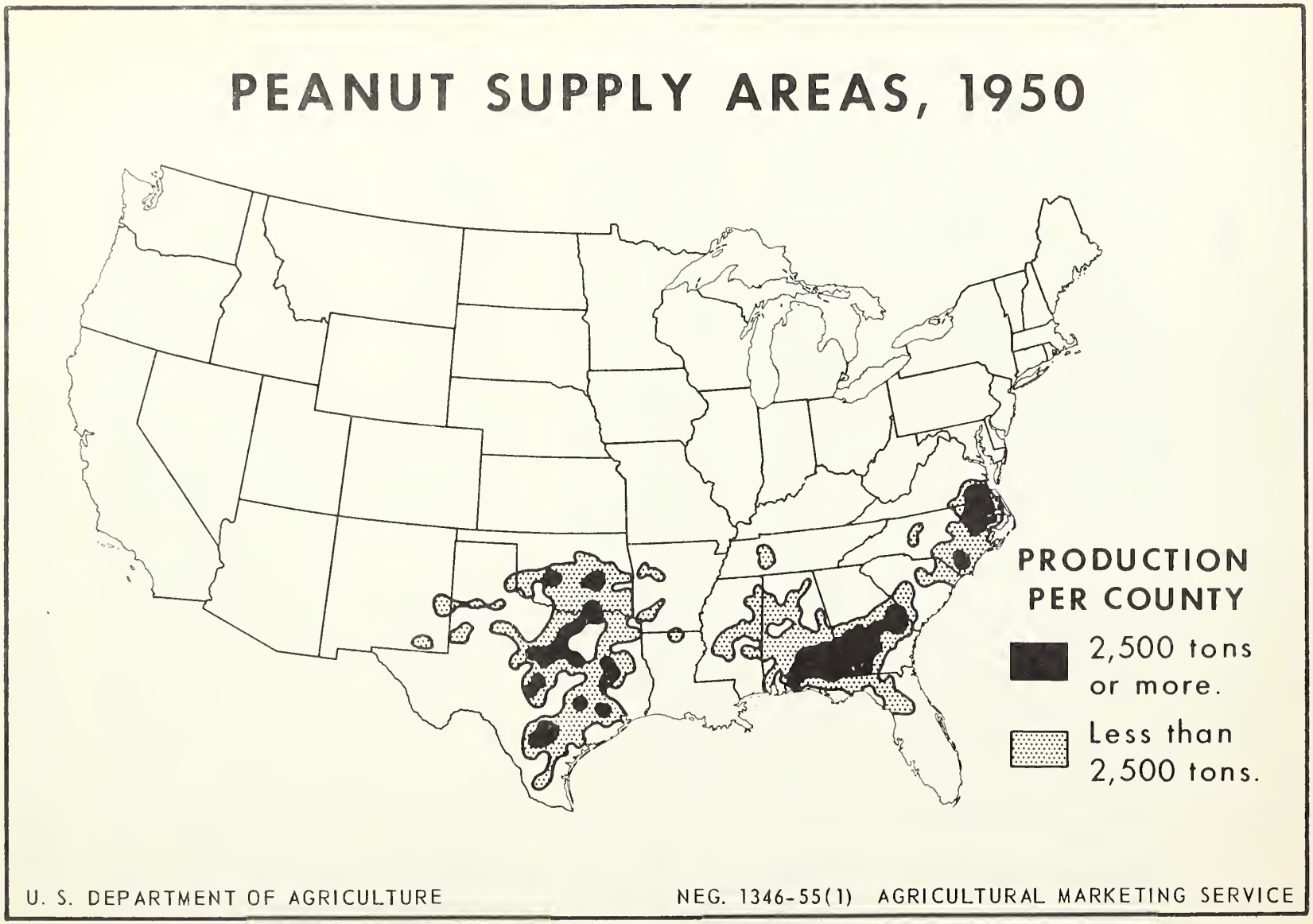
PEANUT SUPPLY AREAS, 1950
PRODUCTION PER COUNTY
2,500 tons or more.
Less than 2,500 tons.
U. S. DEPARTMENT OF AGRICULTURE
NEG. 1346-55(1) AGRICULTURAL MARKETING SERVICE

Figure 1. --Nearly 85 percent of the farmers' stock peanuts are marketed by farmers in the more heavily shaded areas of concentrated production.

peanuts are stored principally in the production areas, while the stocks of cleaned and shelled peanuts are held principally in about 20 of the larger metropolitan centers (fig. 2). As the peanuts move step by step through the marketing channels, the seasonality as well as the geographic concentration characteristic of their production becomes less and less pronounced. This results in a progressively decreasing volume of peanut stocks at each market level between the farmer and the consumer.

Because shellers and dealers hold peanut stocks in larger volume and for longer periods than do the buyers in any other segment of the peanut market, their opportunity for cost savings and other market benefits from improved peanut storage practices appears to be correspondingly greater. Therefore, in this study of the cost and efficiency of storage in marketing farmers' stock, cleaned, and shelled peanuts, the analysis deals principally with farmers' stock.

PEANUT STORAGE FACILITIES AND PRACTICES AT FIRST BUYERS

Storage Capacity and Its Adequacy

Total storage capacity for farmers' stock peanuts at first buyers (including shellers, crushers, and other dealers) for the 1951-52 marketing year was estimated at 220,000 tons in Virginia-Carolina, about 810,000 tons in the Southeast, and 205,000 tons in the Southwest (table 1). Storage capacity at peanut mills (shellers and crushers) amounted to about three-fifths of the total (or about 165,000 tons) in the Virginia-Carolina area, three-fourths of the total in each of the other two areas (460,000 tons in the Southeast and about 130,000 tons in the Southwest).[1] The remaining capacity represents assembly storage at firms which purchased and stored peanuts for sale to millers.

Average storage capacity per firm was found to vary from about 2,100 tons for southwestern buyers to nearly 4,800 tons for southeastern buyers; and capacity per warehouse from about 500 tons in the Southwest to over 1,500 tons in the Southeast (table 2). Storage capacity for shellers (table 3) averaged about 50 percent larger than for all buyers reporting in the Virginia-Carolina area, and about 25 percent larger in the Southwest. (the data for the Southeast were not available in a form to permit summarizing separately for shellers, crushers, and other dealers.) Average storage capacity for shellers was about two-thirds larger in the Virginia-Carolina area than in the Southwest; for other dealers about one-half larger.

Compared with available storage capacity, peak holdings of farmers' stock peanuts for the 1951-52 season were about 165,000 tons in Virginia-Carolina, 290,000 tons in the Southeast, and 55,000 tons in the Southwest; data for the 1952-53 season showed peak stocks of about 195,000 tons in Virginia-Carolina, 250,000 tons in the Southeast, and 25,000 tons in the Southwest (table 1). Thus for all first buyers, peak holdings during the 1951-52 season, when a comparison could be made, were equivalent to 75 percent of capacity in Virginia-Carolina, only 36 percent in the Southeast, and 27 percent in the Southwest. In fact, for the past three milling seasons, storage capacity at shellers and crushers alone has generally been adequate for peak stocks of all buyers of farmers' stock peanuts, in each of the three areas.

Important factors influencing changes between years in the size of peak storage stocks, and therefore the adequacy of existing storage capacity, include changes in production of peanuts, rates of farmers' deliveries to buyers, and rates of milling operations. There is a fairly consistent relationship year after year between production of peanuts and farmers' sales,[2] but a considerable variation in peak stocks as a percentage of farmers' sales even when adjusted for changes in carryover (table 4).

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[1] For the basis of these estimates, see Table 20, Appendix.

[2] In the 4 crop years commencing with 1948-49, peanut farmers sold 94% to 95% of their production of picked and threshed peanuts, varying between 93% and 96% in the Virginia-Carolina area and the Southeast, and between 92% and 95% in the Southwest.

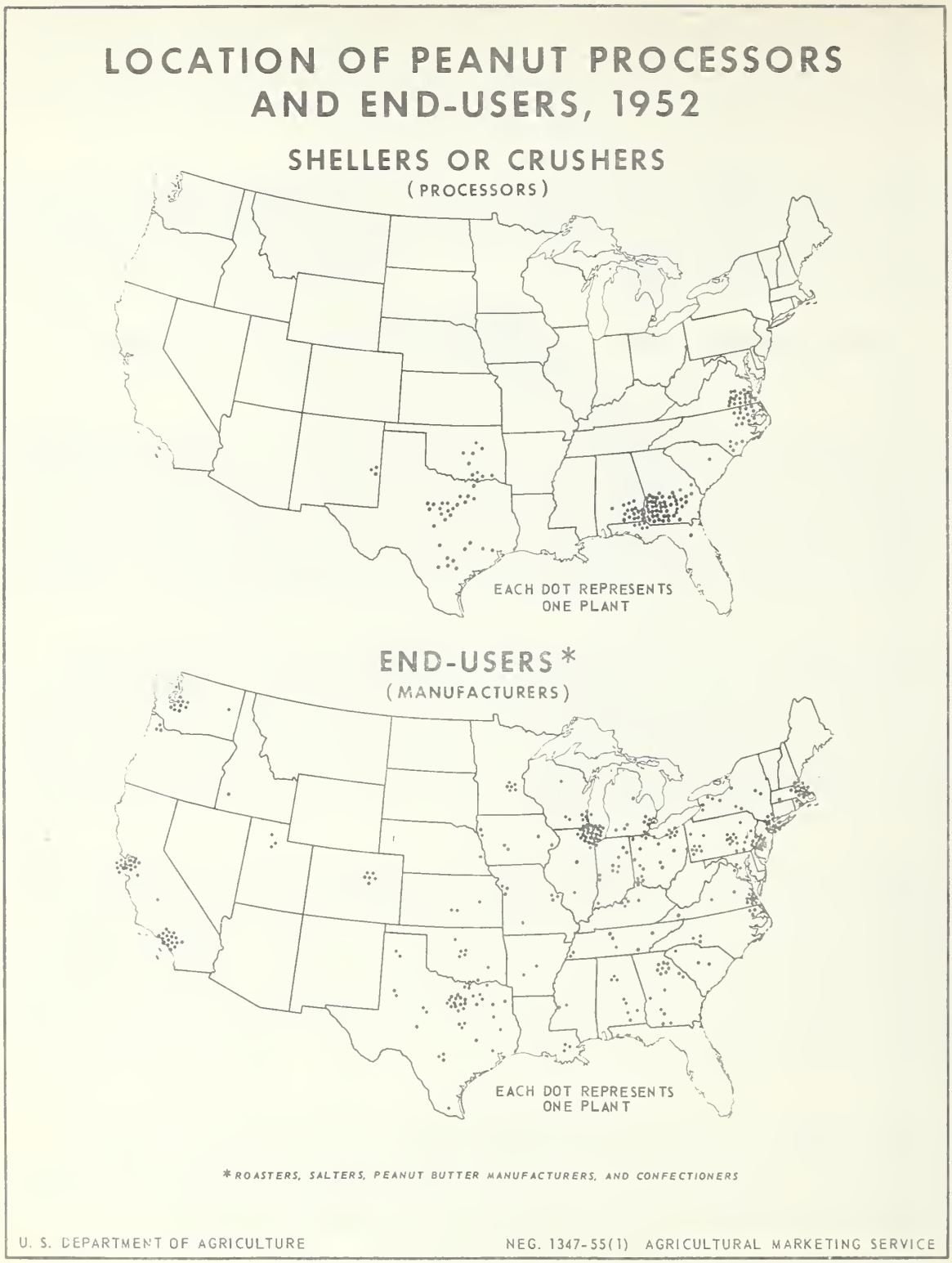
LOCATION OF PEANUT PROCESSORS AND END-USERS, 1952
SHELLERS OR CRUSHERS
(PROCESSORS)
EACH DOT REPRESENTS ONE PLANT
END-USERS*
(MANUFACTURERS)
EACH DOT REPRESENTS ONE PLANT
*ROASTERS, SALTERS, PEANUT BUTTER MANUFACTURERS, AND CONFECTIONERS
U. S. DEPARTMENT OF AGRICULTURE
NEG. 1347-55(1) AGRICULTURAL MARKETING SERVICE

Figure 2.--Most of the stored farmers' stock peanuts are held by shellers and crushers, located in the area of concentrated production (upper map). Most of the cleaned and shelled peanuts are held at end-users' plants, distributed roughly like total population, or at public cold storage warehouses, located principally in the larger cities (lower map).

TABLE 1.--Estimated storage capacity for farmers' stock peanuts at first buyers, 1951, and minimum storage requirement, 1950-51 to 1952-53, by areas

Area	Storage capacity		Storage requirement[1]								
			1950-51			1951-52			1952-53		
	Total	Shellers and crushers	Volume	Percentage of-		Volume	Percentage of-		Volume	Percentage of-	
				Total capacity	Sheller-crusher capacity		Total capacity	Sheller-crusher capacity		Total capacity	Sheller-crusher capacity
	Tons	*Tons*	*Tons*	*Percent*	*Percent*	*Tons*	*Percent*	*Percent*	*Tons*	*Percent*	*Percent*
Virginia-Carolina	220,730	163,390	111,900	51	68	163,500	74	100	[2]193,000	87	118
Southeast	808,860	459,020	362,700	45	79	288,900	36	63	251,000	31	55
Southwest	203,630	128,880	133,500	66	104	54,900	26	43	27,000	13	21
United States	1,233,220	751,290	608,100	49	81	507,300	41	68	471,000	38	63

[1] Year beginning Nov. 1 in Virginia-Carolina, Sept. 1 in the Southeast, Aug. 1 in the Southwest.

[2] Includes about 50,000 tons of farmers' stock peanuts owned by the Commodity Credit Corporation and stored largely at locations where it would not interfere with usual market movement of new-crop peanuts.

TABLE 2.--Average storage capacity per firm and per warehouse at first buyers of farmers' stock peanuts, by areas, 1951

Area	Firms	Warehouses	Capacity		
			Total	Average[1]	
				Per firm	Per warehouse
	Number	*Number*	*Tons*	*Tons*	*Tons*
Virginia-Carolina	33	108	105,310	3,190	975
Southeast	111	316	528,140	4,760	1,670
Southwest	24	107	50,550	2,106	470

[1] Rounded; computed from rounded data.

TABLE 3.--Average storage capacity for farmers' stock peanuts at first buyers, by type of firm, Virginia-Carolina and the Southwest, 1951

Area	Shellers			Crushers			Others		
	Firms	Capacity		Firms	Capacity		Firms	Capacity	
		Total	Average[1]		Total	Average[1]		Total	Average[1]
	Number	*Tons*	*Tons*	*Number*	*Tons*	*Tons*	*Number*	*Tons*	*Tons*
Virginia-Carolina	15	71,400	4,760	3	7,850	2,620	15	26,060	1,740
Southwest	12	31,920	2,660	3	8,280	2,760	9	10,350	1,150

[1] Rounded; computed from rounded data.

The seasonality of farmers' deliveries of peanuts is so sharp compared with the volume milled and shipped (fig. 3) that by the time first buyers' peanut stocks reach their peak, a major portion of the crop is in storage. For the 1951-52 season, peak storage stocks amounted to 61 percent of farmers' sales in Virginia-Carolina, 69 percent in the Southeast, and 48 percent in the Southwest. These ratios were about three-tenths larger than average ratios for the last 3 years in the Virginia-Carolina area, one-fifth larger in the Southeast, and about one-tenth less than average in the Southwest. For the 1952-53 season, corresponding ratios were 80 percent in Virginia-Carolina, 73 percent in the Southeast, and 44 percent in the Southwest.

Warehouse Construction and Condition

Buyers of farmers stock peanuts reported an average of 3.4 warehouses per firm in Virginia-Carolina, 2.8 in the Southeast, and 2.5 in the Southwest. Gable-roofed shed-type warehouses predominated, accounting for about 98 percent of all those reported in the Virginia-Carolina area, 92 percent in the Southeast, and 96 percent in the Southwest (table 5). About one-third of the warehouses in the Virginia-Carolina area had sprinkler systems, one-half in the Southeast area, and none reported for the Southwest. In the Virginia-Carolina area, warehouses were reported to have sprinklers not because peanuts might heat spontaneously but because they burn rapidly once a fire starts.

TABLE 4.--Farmers' sales and peak storage stocks of farmers' stock peanuts at first buyers, by areas, 1948-49 to 1952-53

Year[1]	Virginia-Carolina			Southeast			Southwest		
	Sales	Peak stocks		Sales	Peak stocks		Sales	Peak stocks	
		Amount	Percentage of sales		Amount	Percentage of sales		Amount	Percentage of sales
	Million pounds	*Million pounds*	*Percent*	*Million pounds*	*Million pounds*	*Percent*	*Million pounds*	*Million pounds*	*Percent*
1948-49----	554	264	47.7	1,202	636	52.9	438	234	53.4
1949-50----	410	179	43.7	909	433	47.6	430	205	47.7
1950-51----	443	224	50.6	1,036	725	70.0	444	267	60.1
1951-52----	536	327	61.0	835	578	69.2	230	110	47.9
1952-53----	483	386	79.9	688	502	73.0	124	54	43.5

[1] Year beginning Nov. 1, in Virginia-Carolina, Sept. 1, in the Southeast, Aug. 1, in the Southwest.

Sales from USDA annual reports of production, farm disposition and value of principal field crops.

Stocks from monthly peanut stocks and processing reports.

Although warehouses of frame construction amounted to 18 percent of all those reported in Virginia-Carolina, 34 percent in the Southeast, and 10 percent in the Southwest, warehouses with roofs resistant to fire and lightning (metal, composition, tar-and-gravel) amounted to about 98 percent of the total in Virginia-Carolina, at least 78 percent in the Southeast, and 91 percent in the Southwest.

Warehouses with metal sidings and warehouses with metal roofs comprised 63 and 79 percent respectively in Virginia-Carolina, 39 and 64 percent in the Southeast, 64 and 83 percent in the Southwest. From the Virginia-Carolina area, this was reported to be due to trade experience that peanuts lose moisture more readily in sheet-metal warehouses than in wooden ones, thus reducing spoilage losses.

Floor construction and the elevation of floors above ground level are important to the control of storage losses due to moisture and rodents. Concrete floors predominated among warehouses in the Southeast and Southwest--54 and 42 percent respectively. Wood floors amounted to 79 percent of those reported in Virginia-Carolina, 27 percent in the Southeast, and 25 percent in the Southwest. In the Virginia-Carolina area, floor elevations ranged from 2 1/2 to 5 feet above ground level; in the Southeast, half of the respondents reported warehouse floor elevated 2 feet or more. Floor elevations were not reported for the Southwest; however, in the Southwest, asphalt floors were found to be subject to damage by loaded trucks and occasionally by rats tunneling through for access to the stored peanuts. Only about one-eighth of the Southeastern warehouses were reported to be rat proof, compared with nearly half in the Virginia-Carolina area; similar data were not available for the Southwest.

Some peanut buyers in the Southwest found that moisture damage was more likely to occur where the peanuts were stored on concrete floors. To avoid such losses, a practice reported to be frequently employed was the use of wood slats laid over the floor to allow air circulation around the (bagged) peanuts. This practice was also found in connection with storage of bagged peanuts in earth-floored warehouses in the Southwest and concrete-floored warehouses in the Virginia-Carolina area. In the Southeast nearly all peanuts were stored in bulk, piled directly on the floor. Fan ventilation is found in only about 15 percent of the warehouses in Virginia-Carolina and 10 percent in the Southeastern and Southwestern warehouses.

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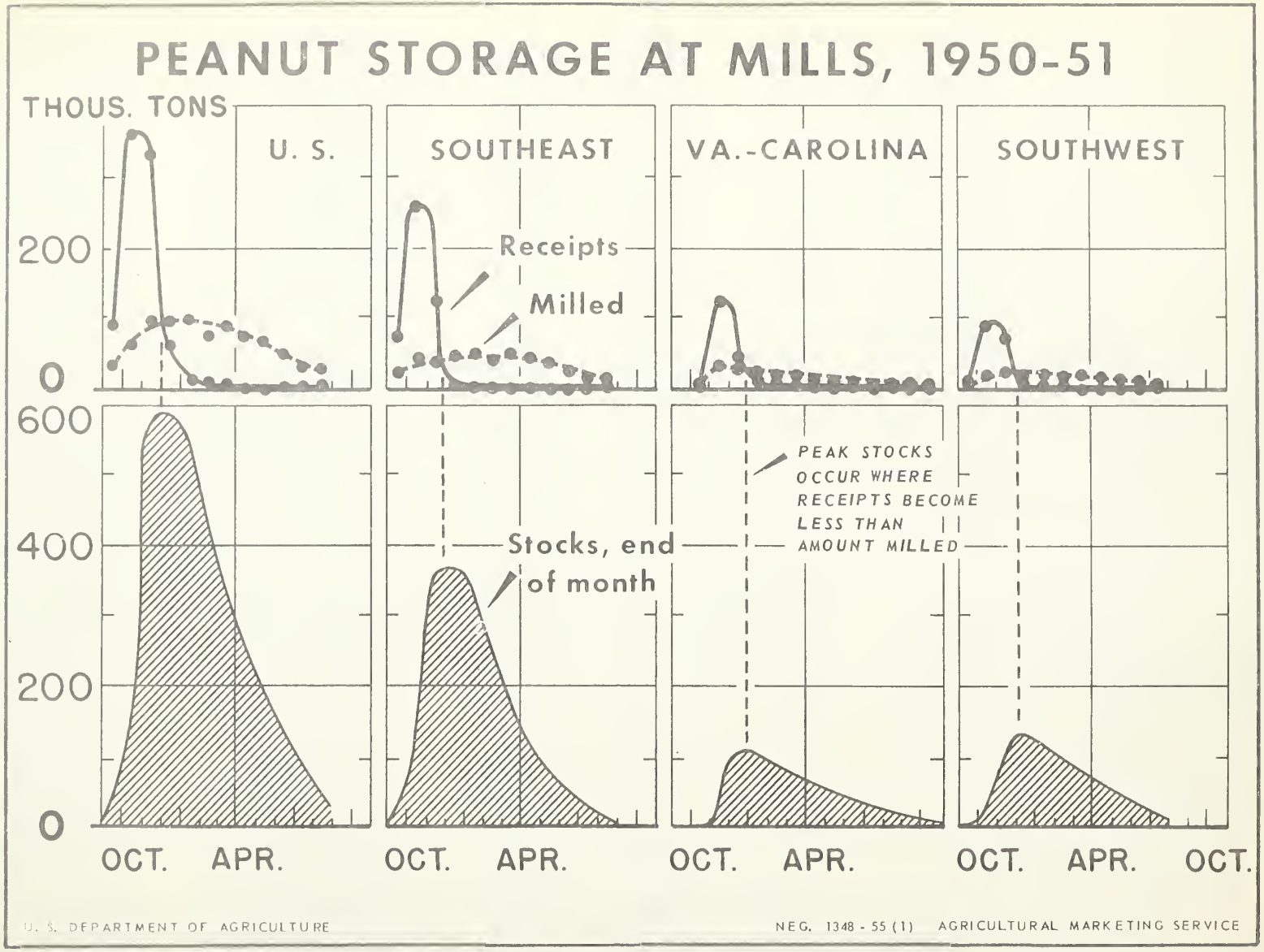

Figure 3. --The volume and timing of market receipts and milling operations (upper chart) govern the size and timing of peak storage stocks (lower chart), and vary greatly between areas and seasons. Stocks increase rapidly early in the season, reaching peak levels in 2 to 4 months when the volume received no longer exceeds the volume milled.

TABLE 5.--Distribution of storage warehouses for peanuts at first buyers, by areas and by characteristics, 1951

Item	Virginia-Carolina		Southeast		Southwest	
	Warehouses	Percentage distribution	Warehouses	Percentage distribution	Warehouses	Percentage distribution
Construction						
Wall						
Gable or shed	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Metal clad	69	63	124	39	68	64
Wood	20	18	106	34	11	10
Concrete block, brick, asbestos	18	17	61	19	25	22
Other	[1] 1	2	[2] 25	8	3	4
Roof						
Metal	86	79	201	64	89	83
Composition	21	19	44	14	9	8
Other	2	2	[3] 71	22	9	9
Floor						
Concrete	20	18	170	54	45	42
Wood	86	79	86	27	27	25
Asphalt	--	--	--	--	12	11
Dirt	--	--	--	--	12	11
Other	3	3	60	19	11	11
Equipment[4]						
Sprinkler	33	30	172	54	--	--
Fan	15	14	32	10	11	10
Total warehouses	109	100	316	100	107	100

[1] Excludes 1 firm reporting silos.
[2] Excludes 6 firms reporting silos.
[3] Includes built-up tar and gravel.
[4] Estimated for all respondents from a subsample of 20 firms for each area.

In each of the three areas nearly all warehouses were reported to be in good to excellent condition. The proportion of warehouses rated as needing repairs amounted to about 10 percent in the Southeast and a negligible proportion in the other two areas. The physical condition of warehouses, as expected, was found to be a factor affecting the problem of maintaining the market grade of the stored peanuts. Although there was little quality loss in storing peanuts at many warehouses, at others there was serious deterioration in some lots of peanuts.

Use of Storage

In the Southwest, the area with the earliest peanut harvest, storage facilities for farmers stock peanuts are in use for an average of 4 to 5 months. Peanut receipts at buyers begin in early August for the South Texas crop, and in September for the rest of Texas and for Oklahoma. Although harvest is usually almost completed by mid-November, peanuts continue to arrive at buying points through December.

In the Southeast, peanut receipts usually begin in late September and continue on an average for a three-month period, varying with the type and volume of peanuts handled

and the weather conditions affecting harvesting and operations. The period of receipts was longer for warehouses where Spanish peanuts comprised 25 percent or more of total volume handled than for warehouses handling few or no Spanish peanuts. The longer operating season for warehouses handling Spanish as well as Runner peanuts was due to receipts of Spanish peanuts beginning about a month earlier than Runners.

In the Virginia-Carolina area, the area with the latest peanut harvest, receipts at buyers begin in the last half of October and reach a peak in early December; here the movement of peanuts at the buyers' plants was described as "continuously in-and-out." The dates on which warehouses were emptied of farmers' stock peanuts vary greatly, but the prevalent practice is to complete the operation before hot weather.

Peanuts were processed from storage stocks over a period averaging 6 to 8 months, with an average period of 2 to 3 weeks' receipts before processing began from storage stocks, a month or two of both receiving and processing, and with processing from storage continuing for a 5-month period after receipts had been completed.

Warehouses in the Southeast were used about 7 to 8 months for handling and storing farmers' stock peanuts. The operating season varied with volume, averaging 5 months for firms handling less than 2,000 tons, and 8 months for those handling more than 5,000 tons. About one-fourth of the warehouses were in use less than 5 months. Although about 1 out of 4 warehouses surveyed was used for other purposes after peanut operations were completed, the use for other purposes averaged only one additional month.

For firms reporting detailed cost data, volume handled during the season exceeded storage capacity in the Southeast by an average of about 40 percent but was somewhat less than capacity in the Southwest for the years studied. In the latter area the volume handled was about 90 percent of capacity for shellers and "other" buyers, and 50 to 70 percent for crushers. Data were not available for Virginia-Carolina.

In addition to volume of peak stocks and length of operating season, analysis of other measures of storage use include average storage stocks, ton-months of storage, average length of storage per ton handled, and ratios between peak and average storage stocks (table 6).

During the three crop years 1949-50 to 1951-52, monthly average storage holdings at buyers of farmers' stock peanuts varied between about 33,000 tons and 90,000 tons in the Virginia-Carolina area, 90,000 and 160,000 tons in the Southeast, and 23,000 and 60,000 tons in the Southwest. Thus, total ton-months of storage use varied between about 350,000 and 1,100,000 ton-months in Virginia-Carolina; about 1,100,000 and 1,900,000 ton-months in the Southeast; and about 275,000 and 730,000 ton-months in the Southwest. On an average, each ton of peanuts handled was stored between 2 and 4 months in the Virginia-Carolina area, 2 1/2 and 4 1/2 months in the Southeast, and 2 and 3 1/2 months in the Southwest.

The extent of the seasonal fluctuation in farmers' stock storage is suggested by the ratio of peak to average monthly storage stocks. These ratios vary widely by season and by area. Available data show that for the years studied, the peak-stocks-to-average-stocks ratios ranged from a high of almost 3 to 1 in some seasons to a low of less than 2 to 1 in other seasons. The highest ratio was found in the Southwestern and Virginia-Carolina areas in 1949-50; the lowest ratio was found in the Southeastern and Virginia-Carolina areas in 1951-52. These ratios emphasize the fact that minimum peak storage requirements for farmers' stock peanuts were far in excess of average storage use.

Changes between years in the size of both peak and average stocks are affected principally by changes in the peanut crop and carryover stocks, with average holdings affected also by changes in rates of peanut receipts and of milling. In the Southeast, the 20 percent decrease in peak stocks from 1950-51 to 1951-52 accompanied a 19 percent decrease in peanut supply. In Virginia-Carolina the 45 percent increase in peak stocks

TABLE 6.--Utilization of storage for farmers' stock peanuts at first buyers, by areas, 1949-50 to 1951-52

Year and area[1]	Storage stocks			Ton-months storage	Average months stored per ton purchased[2]
	Peak	Average	Average monthly stocks as percentage of peak stocks		
	Million pounds	*Million pounds*	*Percent*	*Thousands*	*Number*
1949-50:					
Virginia-Carolina---	179	66	37	394	1.9
Southeast----------	433	186	43	1,118	2.5
Southwest----------	205	74	36	444	2.1
1950-51:					
Virginia-Carolina---	224	108	48	650	2.9
Southeast----------	725	319	44	1,916	3.7
Southwest----------	267	122	46	730	3.3
1951-52:					
Virginia-Carolina---	327	183	56	1,100	4.1
Southeast----------	578	307	53	1,841	4.4
Southwest----------	110	46	42	276	2.4

[1] Year beginning Nov. 1, in Virginia-Carolina, Sept. 1, in the Southeast, Aug. 1, in the Southwest.

[2] Ton-months storage divided by tonnage sold by farmers. For farmers' sales see table 21.

Farmers' sales from USDA annual reports on production disposition and value of principal crops.

Stocks from USDA monthly peanut stocks and processing reports.

accompanied a 15 percent increase in supply, most of the increased supply being increased carryover. In the Southwest, the 60 percent decrease in peak stocks occurred with a 50 percent decline in supply even though partly offset by an increase in carryover. Average monthly stocks, however, decreased about 5 percent in the Southeast and about 60 percent in the Southwest and increased about 70 percent in Virginia-Carolina.

High ratios of peak stocks to average stocks represent low rates of average storage use. Even if storage capacity had been no greater than required for peak stocks, average peanut stocks in the 3 areas would have amounted to only 43 to 56 percent of capacity in 1951-52, 44 to 48 percent in 1950-51, and 18 to 43 percent in 1949-50.

Handlers of peanuts in each area reported that they considered the capacity and the condition of existing storage facilities generally adequate for meeting the physical requirements in storing farmers' stock peanuts. No specific reference was made to maintenance of quality of the peanuts. In this analysis, total capacity was found to be substantially greater than needed for most efficient use, and the size and construction of storage buildings, as well as the extent of their use, were found to affect storage cost.

For the 1950-51 season, costs (excluding shrinkage) for storing farmers' stock peanuts and for the handling in connection with storage, as treated in this study, averaged $6.16 per ton for 20 buyers in the Southeast, compared with $9.58 per ton for 20 firms in the Southwest. Averaged separately for shellers, crushers, and "other" buyers in the Southwest, total storage cost ranged from $9.20 to $9.94 per ton (table 7). Average period of storage in the two areas ranged from 3 1/2 to 4 months in the Southeast and from 4 to 5 months in the Southwest.

Fixed costs (charges for use of storage space, including depreciation, interest on undepreciated investment, taxes and insurance on the storage building) amounted to about 10 to 15 percent of total storage cost, averaging 98 cents per ton in the Southeast compared with $1.23 per ton in the Southwest. Averaged by type of buyer, fixed costs ranged from 92 cents to $1.44 in the Southwest. These fixed costs undoubtedly are higher than they would be if excess storage capacity were not included. They represent such a minor part of total cost, however, that the possible saving by reduced storage space would not present a major revision.

Variable costs (handling the peanuts into storage and out of storage, together with interest and insurance on their value while stored) were two-thirds to three-fourths of total cost, averaging $3.93 in the Southeast as compared with $7.10 per ton in the Southwest. Averaged by type of buyer, variable costs ranged from $6.89 to $7.25 per ton in the Southwest. Length of storage, handling cost, and varying insurance rates were the principal factors accounting for differences in variable costs.

Interest and insurance on the value of the stored peanuts amounted to about one-half to three-fifths of total storage and handling cost, and, of course, increased with the length of storage. Monthly cost for interest and insurance on the value of stored peanuts averaged 88 cents in the Southeast compared with $1.10 per ton for the Southwest. Averaged separately for shellers, crushers and "other" buyer, combined interest and insurance costs per month ranged from $1.03 to $1.19 per ton in the Southwest. The combined interest and insurance costs totaled $3.26 for 3.7 months' storage in the Southeast, and $5.30 for 4.8 months' storage in the Southwest, ranging by type of buyer in the Southwest from $4.87 for 4.1 months' storage to $5.72 for 5 months' storage in the Southwest. The variations were due largely to higher monthly insurance costs in the Southwest: 37 cents, 48 cents, and 52 cents for shellers, crushers, and other buyers, respectively, averaging 43 cents for the Southwest compared with an average 22 cents for all buyers in the Southeast.

Handling Cost

Handling the peanuts into and out of storage, as shown by the surveys, amounted to about 10 to 20 percent of total cost, averaging 67 cents per ton in the Southeast compared with $1.80 per ton in the Southwest. Averaged by type of buyer in the Southwest, handling cost ranged from $1.38 to $2.02 per ton. If conditions for the two areas are assumed comparable, savings through bulk handling appear to have amounted to one-half to two-thirds of handling cost for bagged peanuts. This is deduced from the fact that peanuts are handled in bulk form in the Southeast, and bagged in the Southwest.

In the Southeast, average handling cost by method ranged from 83 cents per ton for permanently installed truck dumps and bucket elevators to 56 cents for pneumatic handling (table 8). Compared with the 83-cent cost for truck dumps and bucket elevators, handling by portable elevators cost 61 cents per ton, although the labor cost was not greatly different for the two methods (41 cents and 48 cents per ton, respectively). For pneumatic handling, labor cost averaged only 24 cents per ton, just half the cost with portable elevators. In this case the cost comparison does not give an adequate concept

TABLE 7.--Summary of cost per ton for storing and handling farmers' stock peanuts at first buyers, southeastern and southwestern areas, 1950-51[1]

Area and type of firm	Amount stored	Storage capacity	Fixed cost per ton capacity	Storage cost					Length of storage	Interest and insurance cost per month
				Total[2]	Fixed[3 4]	Variable[3 5]				
						Total	Handling	Interest	Insurance	
	Tons	*Tons*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Months*	*Dollars*
Southeast[6]	4,945	4,860	1.00	6.16	0.98	3.93	0.67	2.46	0.80	3.7	0.88
Southwest[7]											
Sheller	2,460	2,660	1.32	9.94	1.44	7.25	1.77	3.53	1.95	5.3	1.03
Crusher	2,130	2,930	.67	9.27	.92	7.10	1.38	3.33	2.39	5.0	1.14
"Other" buyer	1,290	1,150	1.19	9.20	1.06	6.89	2.02	2.73	2.14	4.1	1.19
Average	2,001	2,182	1.18	9.58	1.23	7.10	1.80	3.22	2.08	4.8	1.10

[1] Year beginning Sept. 1 in the Southeast, Aug. 1 in the Southwest.
[2] Includes $1.25 per ton for purchasing and weighing.
[3] Excludes $1.25 per ton for purchasing and weighing.
[4] Depreciation, interest on undepreciated investment, insurance, estimated property taxes, and repairs on buildings and equipment.
[5] Interest and insurance cost based on value of stored peanuts along with costs for labor and machinery operation in handling.
[6] Twenty firms handling 98,910 tons; storage capacity 97,190 tons.
[7] Twenty firms handling 40,030 tons; storage capacity 45,260 tons.

TABLE 8.--Average cost of handling bulk peanuts at first buyers, by type of equipment, southeastern area, 1950-51[1]

Type of equipment	Average amount stored per warehouse	Cost per ton					
		Machinery			Labor	Variable machinery and labor	Total machinery and labor
		Fixed	Variable	Total			
	Tons	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Pneumatic unloader-	2,750	0.16	0.16	0.32	0.24	0.40	0.56
Dump pit, bucket elevator---------	1,425	.22	.20	.42	.41	.61	.83
Portable elevator--	1,140	.05	.08	.13	.48	.56	.61

[1] Year beginning Sept. 1.

of the relative efficiencies. It is widely accepted in the industry that handling with portable conveyors does greater damage to the peanuts than with a bucket elevator or a pneumatic unloader.[3]

Since the volume of peanuts handled per hour was substantially the same (about 25 tons per hour) for pneumatic as for dump-and-elevator unloading, the lower average handling cost for pneumatic unloading apparently was largely due to spreading fixed machinery costs over greater volume handled. About 2,750 tons were handled per warehouse using pneumatic unloaders compared with about 1,425 tons per warehouse using dump-and-elevator.

A troublesome question with these handling costs concerns the extent to which they represent extra costs of storing. No precise answer is available, and such an answer as can be given must vary with the position of storage and with type of marketing concern doing the storing. Some shellers and cleaners feed stored peanuts to the mill about as readily as they do current receipts from trucks. In such case, there is little extra handling cost to be chargeable to storage. Others can use stored peanuts only by unloading them out of storage into trucks, and then hauling to the mill and unloading. Dealers, or any nonprocessing buyers, must charge loading both into and out of warehouses entirely to storage.[4] Storage in turn becomes a part of the dealer's cost of trading. Thus, the handling cost to be included in storage cost appears to vary from near zero to the full $2.02 shown as a maximum (table 7). Furthermore, it would seem that the lowest handling charges would be added for the mills with the lowest cost methods of handling.

[3] Peanut pods may be split by the blades or cups of the elevator or, for portable elevators, by working under the blades or chain, or between the chain and sprocket wheel. The problem of pods splitting when dropped from the discharge spout of the elevator to the storage pile appears common to all types of elevators. The possibility of damage appears slight for pneumatic and bucket elevators. But the peanut pods are in position to foul in the moving parts of portable elevators throughout the entire lift, for both blade-on-chain and auger-types. The rubber-faced, cleat-on-belt portable elevator, recently developed, is reported to reduce handling losses due either to contact with metal or to fouling in the moving parts.

[4] For a peanut grower, also storage would require both handling in and handling out, with the full handling cost entering into storage cost.

Fixed Cost

Fixed costs varied among buyers in the Southeast with the extent of use of their storage space and in the Southwest varied similarly between types of buyers. In this study, a total volume of peanuts handled into and out of storage equal to the capacity of storage space available is taken as a basis for comparisons. It is, of course, an arbitrary measure of "efficiency."[5] For a given storage capacity, the larger the volume handled, the lower the fixed cost of storage per ton. By rapid turnover, volume far greater than storage capacity might be handled at an individual warehouse. Thus, in the Southeast, volume handled ranged from 0.4 to 4.8 times capacity, with 13 of the 20 firms handling volume greater than capacity.

Averaged separately by type of buyer in the Southwest, volume handled was 8 percent less than storage capacity for shellers, 27 percent less than storage capacity for crushers, and 12 percent more than storage capacity for "other" buyers. Comparing actual fixed cost per ton (for the volume handled) with estimated fixed cost per ton for a volume equal to storage capacity, actual fixed cost of storage averaged 12 cents per ton higher for shellers, 25 cents per ton higher for crushers, and 13 cents per ton lower for "other" buyers, than with a volume equal to capacity (table 7).

Averaged separately for southeastern warehouses, grouped by volume relative to capacity rather than by type of buyer, volume averaged 74 percent more than storage capacity for about one-third of the warehouses, exactly equal to storage capacity for about one-fourth of the warehouses, and 35 percent less than storage capacity for the remaining two-fifths of the warehouses (table 9). Fixed cost of storage averaged 44 cents per ton less for the first group, because volume was greater than capacity; but averaged 41 cents per ton higher for the last group because volume was less than capacity (table 10).

At individual warehouses, fixed costs per ton capacity declined as capacity increased (table 10). Annual fixed cost per ton of capacity for 58 warehouses, in the Southeast, averaged 87 cents for small warehouses (average capacity 610 tons), 76 cents for medium (average capacity 1600 tons), and 67 cents for large (average capacity 3300 tons)--roughly a decrease of about 10 cents per ton with a doubling of average capacity. At these warehouses, fixed cost per ton also varied with volume handled. They showed savings of about 14 cents to 16 cents per ton for warehouses where volume exceeded capacity, and potential savings of about 10 cents per ton at others by increasing volume to equal storage capacity.

Nevertheless, there was wide variation in fixed costs among individual warehouses of comparable size, as illustrated by costs at typical warehouses in the Southwest. Fixed costs at small warehouses ranged from 74 cents to $1.49 per ton capacity, although capacity was 1100 tons and 1200 tons, respectively, for the 2 warehouses representing the cost range.

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[5] Total fixed cost of storage was allocated to the total number of tons handled during the season to obtain an average fixed cost of storage comparable with other fixed costs. Contrasted with this, total ton-months of storage, compared with the total ton-months of use that could have been obtained from storage space available, has been used to indicate efficiency in the utilization of storage space. Although peanut buyers have only limited control over the size of peak market stocks, they must, as a group, maintain storage capacity adequate to accomodate these stocks even though much of the space will be unused most of the season. Total ton-months of storage use ranged from about one-third to about one-half of the annual capacity of the space required for peak storage, decreasing as the season advanced. With this seasonal pattern of storage, it becomes questionable how to allocate fixed cost of storage between months and between tons of peanuts stored. Peak storage varied so much for the seasons and areas studied that the capacity maintained by shellers and crushers alone represented, in years of greatest storage requirement, roughly 90 percent of peak market stocks, but in years of smallest storage requirement, about twice the volume of peak market stocks.

TABLE 9.--Storage utilization, length of storage and cost per ton for storing and handling farmers' stock peanuts at 20 first buyers, southeastern area, 1950-51[1]

Average volume stored	Warehouses	Average storage capacity	Average months storage per ton handled[2]	Months in operation per season	Cost per ton								
					Fixed			Variable					Total cost[5]
								Handling		Insurance	Interest	Total[4]	
					Building	Machinery	Total[3]	Machinery	Labor				
Tons	*Number*	*Tons*	*Number*	*Number*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
1,300----	17	2,000	4.1	8.7	.90	.26	1.16	.21	.38	.98	3.08	4.65	5.81
1,760----	18	1,760	4.2	7.7	.84	.13	.97	.14	.30	.92	3.15	4.51	5.48
1,960----	23	1,180	2.2	8.2	.47	.13	.60	.15	.36	.62	1.67	2.80	3.40

[1] Year beginning Sept. 1.
[2] Calculated from interest paid, divided by monthly interest and service cost imputed at 4 1/2 percent annually.
[3] Building cost plus fixed machinery cost.
[4] Interest and insurance plus labor and variable machinery cost.
[5] Includes $1.25 purchasing and weighing cost.

TABLE 10.--Storage capacity and use, and saving in fixed cost per ton of peanut storage at first buyers, by construction and size of warehouse and by volume, southeastern area, 1950-51[1]

Warehouses classified by--	Average storage capacity	Average amount stored	Fixed cost		Savings per ton	
			Per ton capacity	Per ton handled	Realized	Potential[2]
Construction:	*Tons*	*Tons*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Silo	4,050	3,325	0.59	0.72	--	0.13
Slate, asbestos	2,600	2,870	.53	.48	0.05	--
Metal	1,550	1,610	.80	.77	.03	--
Frame	1,540	1,780	.94	.81	.13	--
Brick	900	1,000	.69	.62	.07	--
Size:						
500-1000	610	745	.87	.71	.16	--
1001-2500	1,600	1,975	.76	.62	.14	--
Over 2500	3,300	2,860	.67	.77	--	.10
Volume:[3]						
Low	2,000	1,300	.75	1.16	--	.41
Average	1,760	1,760	.97	.97	--	--
High	1,180	1,960	1.04	.60	.44	--

[1] Year beginning Sept. 1.

[2] At 100 percent utilization (volume equal to capacity). This is, however, an arbitrary benchmark for comparing efficiency in use of storage since at individual warehouses volume stored may by rapid turnover be increased to twice or more capacity, with proportionate saving in fixed cost of storage.

[3] Low turnover represented by average of 17 warehouses with volume less than capacity, average turnover by average of 18 warehouses with volume equal to capacity, and high turnover by average of 23 warehouses with volume greater than capacity.

Type of construction and cost levels prevailing at the time and place of construction may have contributed somewhat to variation in fixed cost relative to capacity, but these are confused with size and other factors (table 11). For 58 southeastern warehouses, classified by type of construction, fixed costs per ton capacity were high for frame and metal (94 cents and 80 cents, respectively), intermediate for brick (69 cents), and low for slate or asbestos and for concrete silos (53 cents and 59 cents, respectively). The lower cost for slate and asbestos warehouses compared with metal and frame types was due partly to their larger average capacity (2600 tons, compared with 1500 tons). The lower average cost for brick structures, however, appears to be due to other factors, largely longer useful life and lower repair cost. Since the brick warehouses were built at lower cost levels than those of recent years, these advantages appear possibly to have been exaggerated.

The lower annual fixed cost per ton of capacity for metal warehouses compared with frame warehouses was due largely to differences in original cost per ton of capacity ($9.63 and $11.03, respectively), since their average capacities were practically identical.

Effect of Volume Stored and Length of Storage on Costs

Substantially lower storage cost may be possible at any particular warehouse by increasing the total volume handled. Any increase in volume would result in lower fixed cost per ton, and where the increased volume resulted in a shorter average storage

TABLE 11.--Average original cost and annual cost per ton capacity of peanut storage warehouses in use at first buyers in 1950-51, by type of construction, southeastern area

Construction	Units	Storage capacity	Original cost		Annual cost per ton capacity[1]
			Total	Per ton capacity	
	Number	*Tons*	*Dollars*	*Dollars*	*Dollars*
Frame	15	1,540	16,990	11.03	0.94
Silo[2]	2	4,050	40,500	10.00	.59
Brick	11	900	9,430	10.48	.69
Metal	25	1,550	14,930	9.63	.80
Slate, asbestos	15	2,600	16,600	6.38	.53

[1] Depreciation, interest on undepreciated value, taxes and insurance on building.
[2] Batteries of 3 or more silos including interstice bins.

period, variable cost per ton would be reduced also. However, in the latter instance, the shifting of a portion of variable cost from one group of buyers or processors to another would not necessarily reduce total marketing cost. Because storage capacity already substantially exceeds requirement in each area, increased volume at some warehouses would mean decreased volume at others, with the firms having the better competitive position the most likely to benefit. For reducing storage cost at individual firms, therefore, the saving in variable cost obtainable through controlling length of storage per ton appears to be more important than the saving in fixed cost obtainable through controlling volume handled.

Total storage cost averaged $5.81, $5.48, and $3.40 per ton, respectively, for the southeastern warehouses grouped by volume less than, equal to, and greater than capacity (table 9). Total storage cost for the warehouse group handling volume equal to capacity averaged only 33 cents per ton lower than for the warehouse group handling volume less than capacity; over half (19 cents per ton) of the saving was due to lower fixed cost. Storage cost for the warehouse group handling volume greater than capacity averaged $2.08 lower than for the warehouse group handling volume equal to capacity; 37 cents per ton or less than one-fifth of the total saving was represented by lower fixed cost. Over four-fifths of the difference in storage cost was accounted for by insurance and interest cost savings on the peanuts themselves. As the amount of peanut storage increases at any plant, whether related to size of plant, capacity of storage facilities available, or some other fixed base, the length of storage period for the average ton of peanuts is likely to decrease. The costs of owning and insuring the peanuts decreases correspondingly. Consequently, the savings in costs for the group making more intensive use of their storage facilities amounted to only 37 cents in fixed costs compared with 30 cents for insurance and $1.48 for interest, while handling cost averaged 7 cents per ton higher.

Since relatively little of the cost difference was associated with either length of operating season (8.2 and 7.7 months, respectively) or tonnage of peanuts handled (1960 and 1760 tons, respectively), the savings in storage cost must be assumed to be due chiefly to more rapid turnover at the lower cost warehouse group. Length of storage per ton handled averaged 2.2 months at the warehouse group where volume handled averaged greater than capacity, compared with 4.2 and 4.1 months at warehouses where volume handled was, respectively, equal to or less than, 100 percent of storage capacity.

The savings thus available to individual firms, however, may not reduce the total cost of storing the peanuts between the farmer and consumer. To reduce the average number of months storage per ton at first buyers, if the rate of farmers' peanut sales remained unchanged, would require an increase in the average length of storage at end

users. About nine-tenths of end users' peanut stocks are held in shelled form, requiring cold storage for quality maintenance. Thus, a comparison is needed of the cost of storing the peanuts as farmers' stock in "common" (unrefrigerated) storage and the cost of storing them as shelled peanuts in cold storage.

Cost of Cold Storage Compared with "Common" Storage

In this study, only a few of the first buyers were found to maintain cold storage--none of them in the Southwest. In fact, in each of the three peanut areas it was found that only a limited volume of cleaned and shelled peanuts was held in either refrigerated or "common" storage at shelling plants. It is known, of course, that some of these limited stocks were for manufacture into consumer products locally.

The general practice reported in each area was the shipment of shelled peanuts to end users about as rapidly as milled. This practice has two market advantages. First, the cost of the refrigerated storage that is necessary for maintaining the quality of either cleaned or shelled peanuts for edible products, can be carried more economically by users, since most of the latter handle, in addition to peanuts, a variety of other ingredients requiring refrigeration and are able to obtain better utilization of the refrigeration facilities. Second, individual firms among the millers of farmers' stock peanuts, by shortening the time they hold the peanuts, are able to reduce their cost, not only in interest and insurance cost, but also in price risk. On this latter point, it is important to recognize, however, that such a saving need not lessen the overall cost of marketing peanuts. Someone will, at all times, own them, bear the risk of owning them, and bear either the cost of transferring the risk or of losses incurred.

Many industrial users who manufacture consumer products of peanuts operate their own refrigerated storage facilities, while others hold their stocks of cleaned and shelled peanuts in public storage and pay monthly charges for its use.

The average monthly charge for "cooler" (30° to 50°) storage[6] ranged from $2.20 to $4.20 per ton for bagged shelled peanuts (table 12); from $3.00 to $5.00 per ton for bagged unshelled peanuts. These figures do not include interest and insurance costs on the peanuts. The higher charge for unshelled peanuts was due largely to their greater bulk.

Based on the bag sizes and weights commonly used, as reported by Clay (5),[7] bagged unshelled Virginia peanuts occupy a minimum of about 7 to 8 cubic feet per hundred pounds, compared with about 3 to 4 cubic feet for bagged shelled peanuts. Due to variations in the method of stacking and the air space allowed between bags, the space actually used amounts to somewhat more than these minimum allowances.

An additional charge to cover in-and-out handling of bagged peanuts is customarily added to the storage charge for the first month. Such handling charges vary, for bagged shelled peanuts, from 10 cents to 19 cents per hundred pounds, or $2.00 to $3.80 per ton; for bagged unshelled peanuts, from 13 cents to 24 cents per hundred pounds, or $2.60 to $4.80 per ton. Handling costs for bagged peanuts are higher at refrigerated warehouses than at southwestern buyers (averaging $1.80 per ton (table 7, p.13)), probably due chiefly to higher overhead and labor costs in the larger cities, where most of the refrigerated warehouses are located.

[6] Charges for cold storage and for handling were summarized from information obtained from 16 warehousing firms operating 29 cold storage warehouses located at 26 cities throughout the United States. Charges at public general warehouses for storing cleaned and shelled peanuts in "cooler" storage (30° to 50°) varied widely between cities, between warehouses in the same city, and, for some firms, between summer and winter months at the same warehouse.

[7] Underscored numbers refer to Literature Cited, page 44.

TABLE 12.--Average cost per hundredweight for handling and storing shelled and unshelled peanuts at public cold storage warehouses, by number of warehouses and basis of quotation, United States, 1953[1]

Basis of quotation	Shelled				Unshelled			
	Warehouses	Storage		Handling	Warehouses	Storage		Handling
		First month	Additional month			First month	Additional month	
	Number	*Dollars*	*Dollars*	*Dollars*	*Number*	*Dollars*	*Dollars*	*Dollars*
Flat rate	7	0.27	0.13	0.14	8	0.41	0.24	0.17
Lot size:	15				14			
Carlot		.21	.11	.10		.28	.15	.13
Less-than-carlot		.31	.18	.13		.34	.19	.15
Lot weight:	6				5			
Over 15,000 pounds		.31	.15	.16		.39	.20	.19
5,000 - 15,000		.34	.18	.16		.42	.22	.20
Under 5,000		.39	.20	.19		.47	.25	.22
Under 1,000[2]		.39	.21	.18		.46	.22	.24

[1] Sixteen warehousing firms operating 28 cold-storage warehouses at 25 locations, principally cities served by multiple railroad lines. Although warehouse locations were about evenly divided between cities in peanut-milling and peanut end-use manufacturing States, the sample showed little geographical variation either in the range of rates or in rate basis. At some warehouses, different rate bases were used for scheduling rates for cleaned and for shelled peanuts; some warehouses quoted no rates for storing unshelled nuts.

[2] Of the warehouses quoting rates for lots of up to 5,000 pounds, 4 quoted separately for lots of up to 1,000 pounds.

Moderate cost savings can be obtained at public cold-storage warehouses by storing the stocks of peanuts in shelled form and, whether shelled or unshelled, in carlot quantities. The advantage in storing in shelled form at refrigerated warehouses is emphasized by the fact that average monthly storage charges were about 25 percent less (4 cents to 5 cents per 100 pounds) for shelled peanuts than for other shelled nuts, although they were about 10 percent more (2 cents to 3 cents per 100 pounds) for unshelled peanuts than for other unshelled nuts (table 13).

Costs of storing and handling peanuts average much higher at public cold-storage houses than at warehouses of shellers and other dealers. Bagged peanuts held in public cold storage for 3 1/2 months would incur storage charges of $9.10 per ton if shelled, or $14.70 per ton if unshelled, at average rates for carlot quantities (table 13). This compares with storage space cost of about $1.00 to $1.50 per ton for bagged farmers' stock peanuts in "common" (unrefrigerated) storage at southwestern first buyers.

Handling the bagged peanuts into and out of storage would amount to an additional $2.20 per ton of shelled, $3.60 per ton if unshelled, at average carlot rates for public cold-storage houses. This compares with about $1.40 to $2.00 per ton for handling bagged farmers' stock peanuts at southwestern dealers. Fire-resistant construction, insulation, and equipment for refrigeration and ventilation are among the factors contributing to the higher fixed cost of cold storage warehouses. In addition, the cold-storage warehouses surveyed were located principally in metropolitan areas, where not only land and construction costs but also tax and utility costs are ordinarily higher than in the less urbanized areas, where shellers and other peanut dealers are located.

TABLE 13.--Average cost per hundred pounds for handling and storage of bagged peanuts and other nuts at public cold-storage warehouses, U. S., 1953[1]

Cost element and commodity[2]	Shelled		Unshelled	
	Carlot[3]	Less-than-carlot[3]	Carlot[3]	Less-than-carlot[3]
	Dollars	*Dollars*	*Dollars*	*Dollars*
Storage:				
Peanuts	0.13	0.18	0.21	0.25
Other nuts	.17	.23	.19	.22
Handling:				
Peanuts	.11	.16	.18	.20
Other nuts	.15	.13	.14	.16

[1] 16 warehousing firms operating 28 cold-storage warehouses at 25 locations, principally cities served by multiple railroad lines. Although warehouse locations were about evenly divided between cities in peanut-milling and peanut product manufacturing States, the sample showed little geographical variation either in the range of rates or in rate basis.

[2] Some warehouses quote separate rates for peanuts, pecans, and other nuts; others for peanuts and other nuts; and others quote for the single class nuts and nutmeats.

[3] Averages for carlots include rates quoted on weight basis for lots of over 15,000 pounds; for less-than-carlots include rates quoted on weight basis for lots of up to 15,000 pounds.

Storage cost tends to restrict cold-storage holdings of peanuts to shelled form, limited volume, and limited periods. Peanut stocks of shellers and other dealers tend to be much larger and to be held for longer periods than at cold-storage houses. Consequently, the aggregate risk of shrinkage and damage in storage is a more serious problem for peanut buyers than for manufacturers of peanut consumer products.

In addition to the amounts usually charged to the peanuts as costs of storage and handling, a significant item for the cost of physical loss or quality deterioration must be added for many buyers as a part of storage cost.

LOSSES IN STORING AND HANDLING PEANUTS

Losses in weight--"shrinkage"--may be due to loss of moisture as peanuts dry, or to physical losses of peanuts, either from handling or from rodents and insects. Quality losses may result from insect infestation or heating, decrease in kernel sizes due to moisture loss, or from splitting, mold, or other damage. In this study, shrinkage and quality changes were calculated from market grade and weight data obtained from samples taken as the peanuts were received for storage (in-weight and in-grade) and loaded out of storage (out-weight and out-grade) (fig. 4).[8]

[8] Gross shrinkage represents the difference in gross or total weight including the foreign material as well as the peanuts; net shrinkage the difference in net weight, excluding the foreign material. Moisture loss was calculated for the kernels from market grade factors but was estimated for the shells and foreign material since in peanut grading moisture content is measured for the kernels only. Changes in the content of kernels classed as (1) sound mature, (2) damaged (from heating, molding, or as a result of insect or rodent activity), and (3) "other" (shriveled, small, or split kernels) were also calculated from the grade factors, after first accounting for shrinkage, including moisture, and changes in foreign material.

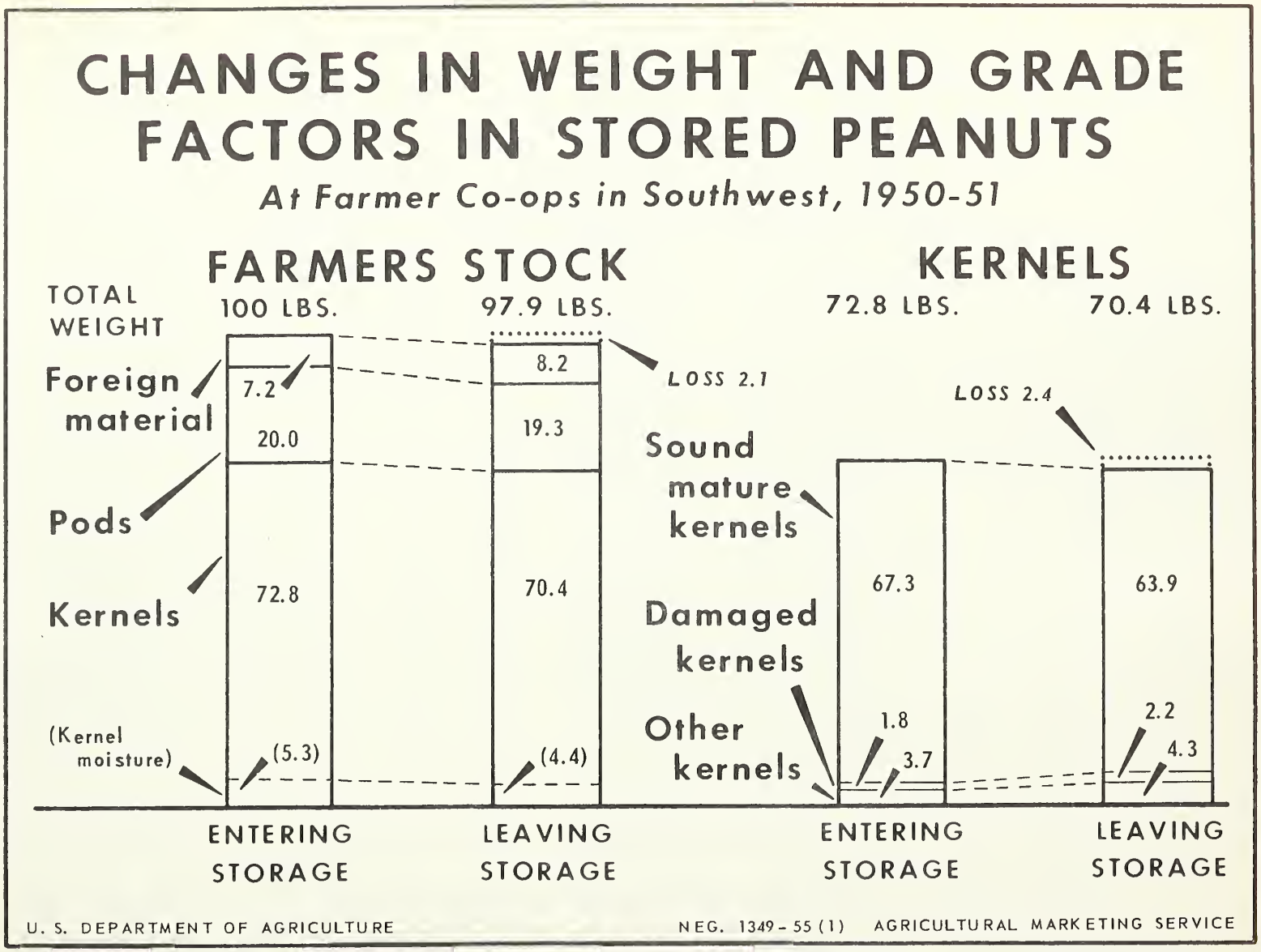

Figure 4.--Changes shown for these peanuts stored at warehouses operated by the Southwestern Peanut Growers Cooperative include moisture loss, kernels lost to rodents or insects or after damage to the pods in placing the peanuts in storage, and changes in foreign material, kernel moisture, and kernel damage or deterioration. The amounts of these changes are calculated from weight and grade factors measured as the peanuts are placed in storage and removed from storage.

Shrinkage losses and deterioration were found to vary with area, season, peanut type, and length of storage. There were, however, some inconsistencies and some unexpected relationships. These were found both in the estimates for all buyers in all areas and in the data for cooperative peanut marketing associations.

The importance of shrinkage as a factor in peanut storage is illustrated by estimates of its cost. The estimates were based on the amount of shrinkage shown by the detailed weight and grade data for farmers cooperative warehouses, since only fragmentary information on shrinkage and deterioration in peanut storage was available from the peanut buyers reporting storage costs in detail.

Cost of shrinkage. --At support-program prices, the extent of shrinkage losses in storing and handling farmers' stock peanuts at warehouses of farmer cooperative peanut marketing associations, for the 1950-51 season, averaged $3.99 for Runners in the Southeast; for Spanish, $6.85 in the Southeast and $7.73 in the Southwest. Factors that affect the amount of shrinkage appeared to account for most of the variation in the dollar cost of the loss. Difference in price by area, peanut type, and season accounted for only a small proportion. For the 1949-50 and the 1950-51 seasons, the cost of weight losses per ton stored was higher in the year of the lower base price. For these 2 seasons, respectively, the cost of losses averaged, for Runners, $12.53 and $3.99; for Spanish, $9.61 and $6.85 in the Southeast, $8.98 and $7.73 in the Southwest. Prices per ton for these 2 seasons were, respectively, $187 and $190 for Runners; for Spanish, $209 and $214 in the Southeast, $204 and $209 in the Southwest.

To compare other costs with shrinkage, adjustment must be made for length of storage. With length of storage adjusted for this example, for Runners, to 3.1 months and for Spanish to 4.6 months in the Southeast and 3.4 months in the Southwest, storage cost averaged $4.64, $5.70 and $6.52, respectively. Thus, for the 1950-51 season, the cost of average shrinkage losses in storing and handling Runner peanuts was only one-sixth lower than "total storage cost", excluding shrinkage; for Spanish, the cost of shrinkage losses was greater than "total storage cost" by about one-fifth in both the Southeast and Southwest.

Thus, variation in the amount of shrinkage appears to be more important than peanut price changes in explaining variations in the cost of shrinkage during storage.

Weight Losses

Estimates of weight losses can be made in a general way, based on carryover stocks and millings, as reported monthly by peanut millers, and on the U. S. Department of Agriculture estimates of farm disposition. They will contain errors of unknown amount, since some firms estimate the volume milled from their shelled out-turn rather than weighing out the peanuts from storage for milling. Also, it is not possible to adjust the volume sold by farmers for variations in moisture content.

Amount of Shrinkage. --Averaged for all buyers, estimated weight losses in handling and storing farmers' stock peanuts, for the 5 seasons 1947-48 through 1951-52, varied between about 1/2 and 2 1/2 percent in the Virginia-Carolina area, 4 and 5 1/2 percent in the Southeast, and about 3 1/4 and 8 percent in the Southwest (table 14). Commencing with the 1949-50 season, the losses were progressively smaller each year in both the Southeast and Virginia-Carolina areas.

The high estimated loss for the 1948-49 and the 1951-52 seasons in the Southwest appears to be associated with poor quality due to adverse weather conditions for curing. (Similar losses and curing conditions were found also for the 1946-47 season.) Following widespread rains and freezing that affected about one-fourth of the southwest crop in both seasons, the peanuts delivered to buyers were reported to contain excessive moisture, foreign material, and damage. The limited information available suggests that the high shrinkage may perhaps have reflected unusually large moisture loss, or perhaps a large proportion of foreign material escaping the sampling probe. It is also

possible that unusually large milling loss occurred in these seasons and resulted in inaccurate reporting of volume milled as estimated from shelled outturn.

TABLE 14.--Estimated percentage of commercial supply lost in handling and storing farmers' stock peanuts at first buyers by area, 1947-48 to 1951-52

Area	Year[1]				
	1947-48	1948-49	1949-50	1950-51	1951-52
	Percent	*Percent*	*Percent*	*Percent*	*Percent*
Virginia-Carolina	2.5	0.3	2.2	1.6	1.3
Southeast	5.6	4.0	4.8	4.6	4.0
Southwest	4.9	5.9	3.2	4.6	8.3

[1] Year beginning Nov. 1 in Virginia-Carolina, Sept. 1 in the Southeast, Aug. 1 in the Southwest.

See Table 21 for source.

Weight losses in storage and handling were lowest each year in the Virginia-Carolina area--where the bulk of the peanut crop is stack-cured on poles before picking and is bagged before marketed--and were greatest in 3 of the 5 years in the Southwest, where the bulk of the crop is windrow-cured but is bagged before marketed. In the Southeast, average losses were intermediate between those in the other two areas in some years, and were higher in some years. In the Southeast, a substantial portion (possibly one-fourth to one-third) of the peanut crop is windrow-cured[9] before picking, but the crop is largely handled and stored in bulk.

There may be some question whether such large shrinkage estimates, based on trade reports, can be brought into agreement with the financial success of peanut milling operations for the same period.

Data from cooperative marketing associations in the Southeast and Southwest further illustrate the problem of losses in weight and changes in selected grade factors. These associations operated as "other" buyers in the purchase, storage, and resale of peanuts.

Average weight losses at cooperatives varied between about 1 and 3 1/2 percent in the Southeast for the 3 years 1949-50 through 1951-52; between about 2 percent and 3 1/2 percent in the Southwest for the 3 years 1948-49 through 1950-51 (table 15). Variation within seasons in weight losses, by peanut type and area, was larger in 1949-50 (1 1/2 to 3 1/2 percent) than in 1950-51 (1 1/2 to 2 percent).

In the Southwest, weight losses for farmer cooperatives consistently averaged only about one-half as large as for all buyers in each of the three seasons, 1948-49 through 1950-51. In the Southeast, losses for the cooperatives were for each season progressively smaller than for all buyers, declining from about one-half as much in 1949-50 to less than one-third as large in 1951-52. Data from the cooperatives show also that shrinkage may in some seasons vary less by area than by peanut type. Weight losses for Spanish peanuts in the Southeast were less comparable with those for Runner peanuts in the same area than with those for Spanish peanuts in the Southwest.

[9] A study of production practices on 135 farms growing Runner peanuts in southeast Alabama (4) showed that peanuts were cured in windrows on one-fourth of the farms with large acreages (more than 30 acres) of peanuts, and on one-eighth of the farms with medium acreages (11 to 30 acres). Peanuts were cured in stacks on all farms with small peanut acreages (10 acres or less). Classed by size, the peanut enterprise was large-scale on 31 percent of the farms sampled, medium on 42 percent and small on 27 percent.

TABLE 15.--Average percentage loss in weight in handling and storing farmers' stock peanuts at warehouses of farmer cooperative marketing associations, southeastern and southwestern areas, 1948-49 to 1951-52

Peanut area and type	Year[1]			
	1948-49	1949-50	1950-51	1951-52
Gross weight:				
Southeast:				
Runner	---	3.7	1.6	1.5
Spanish	---	1.6	2.2	.8
Southwest:				
Spanish	3.6	1.9	2.1	---
Net weight:				
Southeast:				
Runner	---	6.7	2.1	2.8
Spanish	---	4.6	3.2	2.2
Southwest:				
Spanish	3.9	4.4	3.7	---

[1] Year beginning Sept. 1 in the Southeast, Aug. 1 in the Southwest.

Shrinkage and Length of Storage. --For the three seasons, 1949-50 through 1951-52, weight losses showed unexpected relationships with length of storage. Averaged for all buyers, the larger losses and the shorter storage periods were associated in both the Virginia-Carolina and southeastern areas, though not in the Southwest. This probably reflects a situation in which condition of the peanuts caused variation in storage period, instead of resulting from it. Peanuts that were deteriorating apparently had their storage period cut shorter than did others--with those not usable for milling being discarded, contributing to the larger losses.

These data for losses represent the differences between total weights of all peanuts purchased and of peanuts milled (for all buyers) or sold (for farmer cooperatives). Some of the peanuts were held in storage but others may have been milled as soon as delivered. Part of the loss represents foreign material or badly damaged peanuts sorted out before milling; part is shrinkage either during storage or in handling.

Averaged by season for the Southeast and Southwest, and in the Southeast by type of peanut, weight losses at farmers' cooperatives show in a general way increasing loss with increasing length of storage (fig. 5). The data also show about the same percentage losses for both areas in 1949-50 and 1950-51. Neither Spanish nor Runner peanuts showed a consistent advantage over the other in respect to weight loss in storage.

These weight losses were calculated from differences observed in gross weight, including both peanuts and the foreign material incorporated with them. Buyers' actual losses in storage and handling are calculated from net weights, however, first subtracting the foreign material.[10] The data from cooperatives in the Southeast and Southwest show that net weight losses were larger than gross weight losses every year, in each area, and for both types of peanuts (table 15).

[10] Prices paid for farmers' stock peanuts are discounted heavily with increasing content of moisture, damage, and foreign material because of the increased storage losses and increased operating costs in sorting out the unusable portions during the milling operation.

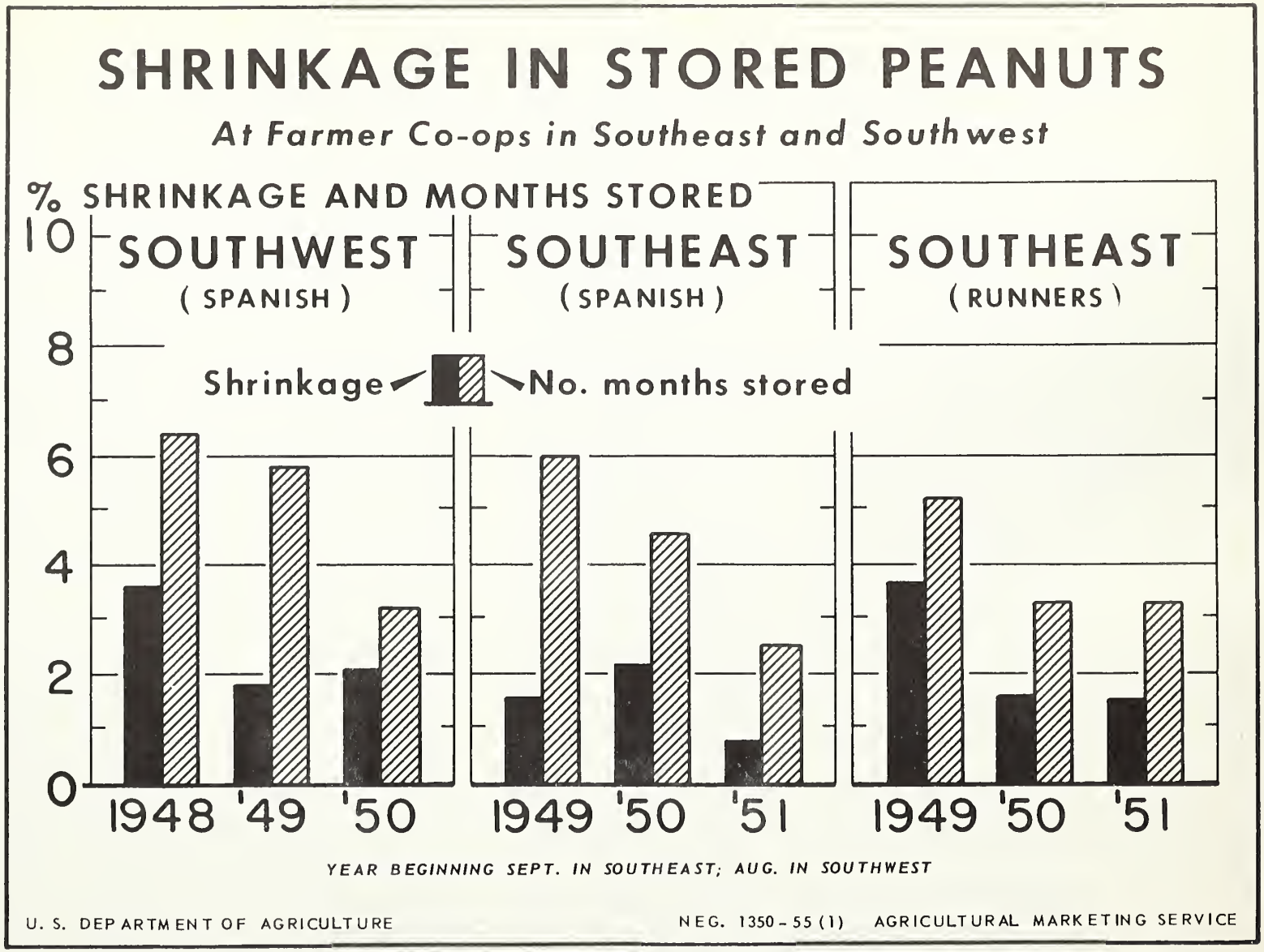

Figure 5.--For farmers' stock peanuts stored at farmer cooperatives in the Southeast and Southwest, the longer storage periods were associated with the larger amounts of shrinkage.

Average net weight losses during storage and handling varied between 2.2 and 4.6 percent for Spanish peanuts, 2.1 percent and 6.7 percent for Runners. No consistent differences appeared to be maintained, however, between areas or types.

Changes in Foreign Material and Moisture

The difference between gross weight loss and net weight loss is largely explained by an apparent increase in foreign material content during storage. "Out-grades" [11] showed higher foreign material content than "in-grades" for each year, each area, and for both Runner and Spanish peanuts (table 16). Calculated as pounds of foreign material per hundredweight of ungraded peanuts received, the increase shown in foreign material during storage ranged from 1.0 to 2.5 pounds in 1949-50 and from 0.7 to 1.2 pounds in 1950-51. For Runner peanuts in the Southeast, the amount of increase in foreign material was less pronounced each year. In 1949-50, the increase was 1.6 pounds but in 1951-52 was only 1.1 pounds. Because Spanish peanuts showed somewhat erratic changes, it is doubtful that the decreasing rate of gain in foreign material can anywhere be considered a consistent movement (table 17).

The increase in foreign material is difficult to explain. Since shell fragments are included with the dirt, stems, and stones in determining foreign material content, splitting of the pods during handling may be one of the important causes of the foreign material increase during storage. On the other hand, it has been reported (9) that the amount of foreign material found in grading Spanish peanuts at buyers in the Southeast declined as the average distance hauled from the farm increased; the explanation being offered that when peanuts are hauled over rough roads[12], much of the foreign material settles to the bottom of the load and is not reached by sampling probe.

In this study, the recorded "in-grade" foreign material content showed little or no association with the amount of the increase in foreign material during storage. "In-grade" foreign material content was not only lower but also showed less variation between seasons for both Runner and Spanish peanuts in the Southeast (ranging from 3.5 to 3.9 percent) than in the Southwest (ranging from 5.2 to 7.2 percent). Since less than one-half of the peanuts are cured in windrows in the Southeast, but all in the Southwest, the method and conditions of curing appear to affect foreign material content of the peanuts delivered to the market. That, however, would not explain the increase in foreign material during storage. Although the amount of foreign material escaping the sampling probe may increase as the foreign material content increases, it would appear that only part of the increase in foreign material during storage was due to sampling error.

The apparent gain in foreign material showed only a small and inconsistent association with length of storage. Rodents feeding on the kernels would account for an increase in peanut shell fragments and empty pods in the foreign material, but the increase could be expected to increase as length of storage increased. On the other hand, an increase in peanut shell fragments and empty pods because of damage in handling would not be associated with length of storage.

The serious nature of the problem of foreign material is illustrated by an estimate that hauling foreign material to market with peanuts accounted for 116,850 ton-miles of uneconomic hauling in Georgia in a single season. (9) In addition to transportation, a considerable cost is involved in storing and handling the foreign material along with the peanuts, and for equipment and labor in removing the foreign material. Although many improvements have been made in the machinery used for removing foreign material, (6) some handpicking is still necessary at many shelling plants, and high foreign material content increases handpicking cost.

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[11] "In"-grades are obtained by grading a sample taken as the peanuts are delivered to the buyer's warehouse; "out"-grades from a sample taken as the peanuts are loaded out of storage.

[12] In 14 of the 19 principal peanut-producing counties in Alabama, over 60 percent of all farms were located on unimproved roads in 1950. (8)

TABLE 16.--Percentage content of selected grade factors in farmers' stock peanuts entering and leaving storage at warehouses of farmer cooperative marketing associations, southeastern and southwestern areas, 1948-49 to 1951-52[1]

Grade factor, area, and type	Entering storage				Leaving storage			
	1948-49	1949-50	1950-51	1951-52	1948-49	1949-50	1950-51	1951-52
Foreign material:								
Southeast	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Runner	---	3.5	3.9	3.9	---	5.3	5.2	5.1
Spanish	---	3.8	3.8	3.8	---	4.9	4.6	4.9
Southwest								
Spanish	6.1	5.2	7.2	---	6.5	8.1	8.4	---
Moisture:								
Southeast								
Runner	---	7.8	6.9	7.0	---	6.8	6.5	6.4
Spanish	---	7.7	6.9	6.7	---	7.0	6.2	6.4
Southwest								
Spanish	---	7.5	7.2	---	---	7.0	6.2	---
Sound mature kernels:								
Southeast								
Runner	---	70.5	68.1	64.5	---	69.1	67.5	63.4
Spanish	---	73.5	71.1	68.9	---	72.2	71.3	67.8
Southwest								
Spanish	71.0	71.9	72.4	---	71.7	70.0	71.3	---
Damaged kernels:								
Southeast								
Runner	---	1.2	1.4	3.5	---	0.8	1.4	3.9
Spanish	---	1.4	2.2	2.4	---	1.2	2.3	3.0
Southwest								
Spanish	---	1.3	2.0	---	---	2.1	2.5	---

[1] Year beginning Sept. 1 in the Southeast, Aug. 1 in the Southwest.

TABLE 17.--Loss in weight per hundredweight in storing and handling farmers' stock peanuts at warehouses of farmer cooperative marketing associations, by selected factors, southeastern and southwestern areas, 1949-50 to 1951-52[1]

Factor	1949-50	1950-51	1951-52
Southeast Runners:			
Net shrinkage	*Pounds*	*Pounds*	*Pounds*
Moisture loss	1.3	.5	.7
Increase in foreign material	1.6	1.2	1.1
Unexplained weight loss	3.0	.7	.8
Total	5.9	2.4	2.6
Decrease in sound mature kernels[3]	5.4	2.2	2.7
Change in damaged kernels[3]	.5	0	.2
Southeast Spanish:			
Net shrinkage			
Moisture loss	.9	.8	.4
Increase in foreign material	1.0	.7	1.1
Unexplained weight loss	1.6	1.4	.5
Total	3.5	2.9	2.0
Decrease in sound mature kernels[3]	3.8	1.9	3.6
Change in damaged kernels[3]	.2	0	.5
Southwest Spanish:			
Net shrinkage			
Moisture loss	.8	1.1	---
Increase in foreign material	2.5	1.0	---
Unexplained weight loss	1.1	1.1	---
Total	4.4	3.2	---
Decrease in sound mature kernels[3]	4.9	3.3	---
Change in damaged kernels[3]	.7	.4	---

[1] Expressed as pounds per hundredweight of ungraded peanuts stored. Year beginning Sept. 1 in the Southeast, Aug. 1 in the Southwest.

[3] A decrease in sound mature kernels or an increase in damaged kernels represents a loss in market quality.

Computed from data furnished under contract by the Alabama and Texas Agricultural Experiment Stations.

Moisture. --Moisture losses during storage of farmers' stock peanuts, as expected, appeared to increase generally with both initial moisture content and with length of storage. However, the amount of weight lost as moisture from the peanuts was calculated to be so small as to account for only about one-third to one-half of the total weight lost. [13] Calculated as pounds per hundredweight of peanuts received, loss in moisture from the peanuts ranged from 0.8 to 1.3 pounds in 1949-50 and from 0.5 to 1.1 pounds in 1950-51. The amount of such loss declined each year for Spanish peanuts in the Southeast, from an annual average of 0.9 pounds in 1949-50 to 0.4 pounds in 1951-52. For Runners, the averages varied erratically between 0.5 pounds and 1.3 pounds. In 1949-50 and 1950-51, such losses for Spanish peanuts in the Southwest were 0.8 pounds and 1.1 pounds, respectively. The amount of moisture loss showed a general increase with length of storage and also with increasing initial moisture content, which ranged between 6.7 percent and 7.8 percent for these observations.

The unexplained remainder of the shrinkage, after accounting for an increase in foreign material[14] and the loss in moisture, amounted to at least as much as calculated moisture loss for each average tested, whether by area or type (table 17). These unexplained losses ranged from 1.1 to 3.0 pounds in 1949-50 and from 0.7 to 1.4 pounds in 1950-51. In the Southeast again, the amount declined each year for Spanish peanuts but varied erratically for Runners between 0.7 pounds and 3.0 pounds. In the Southwest such losses showed no change between 1949-50 and 1950-51. The amount of unexplained loss showed 3 general relationships--with moisture loss, with initial moisture content and, to a less extent, with length of storage.

The relationship of unexplained losses with length of storage and moisture losses implies that part of the unexplained weight losses during storage are due to loss of moisture in the foreign material and errors in estimating the amount of moisture lost in the shells. As a rough approximation, moisture loss in the foreign material was estimated to range between 0.02 pounds and 0.1 pounds per hundredweight of farmers' stock peanuts stored. [15] Even when moisture losses for the pods (shells) were estimated to occur at twice as great a rate as in the kernels, the sum of the adjustments was so small as to account for only 15 percent to 30 percent of the unexplained loss. [16] The net adjustments amounted to about 20 to 50 percent increase in the respective moisture losses originally calculated. However, after accounting for the increase in foreign material as pods that had been split, only two-fifths to two-thirds of the remaining shrinkage could be accounted for as moisture loss for the various seasons and peanut types.

Insects and Rodents. --Insects and rodents are nearly always a problem at warehouses where peanuts are stored. Some peanut kernels will inevitably be consumed by the feeding of insects, mice and rats; part of these will likely have been spilled from pods that were split in handling. In either case, the weight of the foreign material in the storage pile would increase, the weight of kernels would decline. Between seasons, the

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[13] The measurement of moisture content in grading farmers' stock peanuts is limited to the kernels; moisture content is not measured for the pods (shells) or foreign material. In this study, moisture loss was estimated for the kernels and the pods enclosing them, from net-weights and the respective moisture contents. This involved the assumption that total moisture loss was in proportion to kernel moisture loss. This seemed to be the best approximation that could be made, because data for total kernel content were not available for all areas, peanut types, and seasons.

[14] A net loss since it was paid for by the buyer at peanut prices.

[15] Estimated from moisture losses for the kernels and pods, by ratios between in net weight and in gross weight.

[16] Estimated by apportioning calculated moisture loss between the kernels and the pods on the basis of estimated in-grade total kernel content, then doubling the amount of the estimated moisture loss from the pods. The sum of the estimated moisture loss in the foreign material and the net increase in the estimate of moisture lost from the pods amounted to about one-fourth to one-half pound for Runners, one-eighth to one-fourth pound for Spanish in the Southeast, and one-fourth to one-third pound for Spanish in the Southwest.

amount of unexplained loss was associated with the extent of increase in foreign material during storage. This indicates that the increase in foreign material may well include some pods that contained kernels when sampled for grading before being placed in storage, and that lost part or all of their kernels during handling or storage. But the observations vary widely.

Based on the estimated ratio of shells to kernels, not enough loose kernels were recovered for their pods to have explained the entire increase in foreign material observed. Either some of the kernels from pods split in handling were lost, or there was an increase in foreign material other than split and broken pods. The fact that some kernels were lost is suggested by the ratios of loose kernels recovered to the kernel content of pods split and broken in handling (the increase in foreign material); the ratios of kernels recovered being larger in bagged peanuts than in bulk, i.e. larger in the Southwest than in the Southeast. The rate of apparent damage to the pods during storing and handling the peanuts, however, was also larger for the Southwest than for the Southeast in both 1949-50 and 1950-51.[17]

Thus it appears that in some seasons the method and conditions of curing may be important along with the method of handling in affecting the amount of losses in handling and storage.

Since in every case for these limited observations the unexplained loss was positive, unexplained loss appears to be definitely a loss rather than sampling error, unless, of course, there may have been some consistent bias inherent in the equipment, methods, and conditions of sampling and grading. The data available for this study were not sufficiently detailed for explaining all of the shrinkage in storing peanuts. Only a rough approximation of the moisture lost in the shells and foreign material could be developed from the grade factors, and such estimates appeared to account for only a fraction of the unexplained loss.

Some loss in kernel weight should also be expected from chemical changes, for until it is processed the peanut kernel is a living (though dormant) seed, and some dry matter would be consumed in respiration and other life processes. Since it was not possible to estimate the amount of kernel weight lost in respiration, the unexplained loss could not be attributed solely to kernel losses from damage to the pods or from rodents or insects.

Changes in Sound Mature Kernels and Damaged Kernels

Changes during storage in the amount of sound mature kernels and in damaged kernels contained in farmers' stock peanuts were associated generally with length of storage, initial kernel-moisture content, moisture loss, increase in foreign material, and unexplained weight losses. Changes in the amount of damaged kernels were not associated with changes in the amount of sound mature kernels, and showed less association than did sound mature kernels with the amount of increase in foreign material.

Losses in sound mature kernels per hundredweight of peanuts received ranged from 3.8 to 5.4 pounds in 1949-50 and from 1.9 pounds to 3.3 pounds in 1950-51. Losses in sound mature kernels over 3 seasons varied, for Runners, between 2.2 and 5.4 pounds;

[17] The proportion recovered of the kernels contained in the pods which were assumed to have been split would have been about one-half, three-fourths, and five-sixths for Runners and about two-thirds, three-fifths and nine-tenths for Spanish in the Southeast (1949-50 through 1951-52 seasons, respectively), about nineteen-twentieths and four-fifths for the Southwest (1949-50 and 1951-52 seasons respectively). The corresponding rate of damage to the pods in handling and storage would have been, per hundredweight of farmers' stock peanuts, 6.4 pounds, 3.8 pounds and 4.1 pounds for Runners; 4.8, 3.2 and 4.6 pounds for Spanish in the Southeast; 10.9 and 4.3 pounds for Spanish in the Southwest, for the respective seasons.

for Spanish in the Southeast between 1.9 and 3.8 pounds; for Spanish in the Southwest the losses varied between 3.3 and 4.9 pounds. Between seasons, the larger losses in sound mature kernels were associated generally with longer storage periods, higher initial moisture content, larger moisture loss, greater increases in foreign material, and larger unexplained weight loss; these associations were more consistent for Runner peanuts than for Spanish. Within any one season only length of storage showed a consistent association. Within seasons, the larger losses in sound mature kernels were associated with the shorter periods of storage, but varied more between areas and peanut types than with variations in length of storage. Again it appears that deteriorating peanuts are taken out of storage sooner than those that are storing well.

Part of the decrease in sound mature kernels during storage may be accounted for by an increase in "other" kernels, the kernels shriveling as they lost moisture in storage or from splitting in handling. Data are too limited to draw conclusions regarding the changes during storage in content of the principal classes of kernels. Mold growth seems an unlikely explanation, since the decline in sound mature kernels was not associated with increase in damaged kernels.

Changes during storage in the amount of damaged kernels, calculated as pounds per hundredweight of peanuts received, ranged from 0.5-pound losses to 0.7-pound increase in 1949-50 and from no change to 0.4-pound increase in 1950-51. In the Southwest, damaged kernels increased 0.7 pounds and 0.4 pounds, respectively, in the two years. Loss in market quality measured by changes in damaged kernel content was greater generally when moisture loss was lower, when unexplained losses in weight were lower, when the period of storage was shorter, and, for the 1949 season, where initial moisture content was lower. Data for the Southwest showed greater consistency between seasons in these relationships than did those for the Southeast.

Factors Affecting Storage Losses

Important factors affecting the condition and storability of peanuts appear to include method of curing, stage of maturity when dug, length of curing period, and weather conditions during curing. In Georgia, both the yield and the shelling percentage of Spanish peanuts were higher in 1945 and lower in 1946 for stack-cured than for windrow-cured peanuts. (1)

In a study of Runner peanuts grown on 135 farms in Alabama, those dug on September 27 and cured until October 28 contained 1.8 percent damage, others dug September 20 and cured until October 16 contained 2.0 percent damage, while those dug September 19 and cured until October 11 contained 2.3 percent damage. (4) The peanuts were stack-cured on all farms in the first group, windrow-cured on one-eighth of the farms in the second and one-fourth of the farms in the third. The lower the average content of damaged kernels found in grading the cured peanuts, the later in September the peanuts had been dug, the longer they had been cured and the smaller the proportion that had been cured in windrows. There were no consistent differences in content of moisture or of kernels classed as sound mature or shriveled.

Storage losses may be particularly noticeable in the years when weather conditions are unfavorable for curing in windrows. Damage commencing during curing is fairly common in some seasons in the Southeast or Southwest. For example, it has recently been reported that "in the Southwest the unharvested crop in shock-rows in the fields is drying slowly because of damp weather. . . there is considerable damage from too much rain with many kernels molding in the center (hidden damage) and deteriorating . . . some frozen peanuts are being found in stock delivered from western Oklahoma." (10) Peanuts damaged by rain or cold during the curing period appear more likely to mold or rot in storage than are undamaged peanuts. Deterioration from freezing or hidden damage may begin during curing and proceed rapidly in storage, causing large losses if not detected.

Controlling Losses. --Buyers have little control over storage losses caused by weather conditions during curing except to mill such peanuts immediately upon receipt. The opportunity to reduce weight or grade losses that occur during storage appears limited to such management practices as storing only clean, dry peanuts, and to carefully controlling handling methods, conditions of storage, and length of storage.

Warehouses of farmers' cooperative marketing associations have to observe moisture and foreign-material limits set by government peanut programs. At these warehouses, average length of storage for 3 consecutive seasons was found to vary between 2 1/2 and 6 months in the Southeast, and between 3 months and about 6 1/2 months in the Southwest (table 18). In the Southeast, the average storage period for Spanish peanuts was about a month longer than for Runners in each of 2 years, about a month less in the third year. Spanish peanuts were stored at farmer cooperatives about the same average number of months in both the Southeast and Southwest in 1949-50; in 1950-51, about 6 weeks longer in the Southeast than in the Southwest.

TABLE 18.--Average number of months of storage for farmers' stock peanuts at warehouses of farmer cooperative peanut marketing associations, southeastern and southwestern peanut areas, 1948-49 to 1951-52

Peanut area and type	Year[1]			
	1948-49	1949-50	1950-51	1951-52
	Number	*Number*	*Number*	*Number*
Southeast:				
Runner	---	5.2	3.4	3.4
Spanish	---	6.0	4.6	2.5
Southwest:				
Spanish	6.3	5.9	3.1	---

[1] Year beginning Sept. 1 in the Southeast, Aug. 1 in the Southwest.

At farmer cooperative warehouses, the average length of storage declined every year for 3 years, in both areas. At the same time, average length of storage per ton for all buyers increased from year to year in all 3 areas (table 6, p. 11). Thus, while warehouses other than cooperatives must have stored whatever lower quality peanuts were marketed, except those milled immediately upon receipt, they also were storing them for longer and increasing periods.

Harvesting, handling, and marketing practices that hold foreign-material content to a minimum would reduce three kinds of costs: storing the peanuts, handling them, and storage losses. The peanuts could be cleaned either at buying points or on farms. In either case it would help to reduce losses and deterioration in storage.

Removal of the foreign material at buyers' warehouses before storage obviously would require special machinery or equipment, but such equipment is already on hand at most shelling plants. Cleaners, stoners, and magnetic separators are widely used as the first step in the shelling operation. The step would, of course, increase the buyers' labor requirement during the peak of the receiving season. For buyers who do no processing, cleaning would increase their operating cost. Not only would fixed cost per ton of peanuts be raised but shrinkage and damage might increase in the form of pods split and kernels damaged by the additional operation. Further, for many of these buyers, an additional investment for equipment would be necessary. Cost disadvantages could also arise at some shelling plants. Where cleaning and shelling equipment is installed in a building apart from the peanut storage houses, added costs and losses would be incurred for the additional handling necessary.

In some cases it might be less costly to clean the peanuts on the farm. The use of discount schedules by farmers in paying for custom picking, similar to the discounts used in pricing their peanuts, might provide the necessary incentive for clean peanuts. Pickers now widely used can be adjusted to remove most of the foreign material.

Furthermore, the risk of storage losses is reported to be one of the factors encouraging harvest-time selling. Reducing this risk would tend to encourage storage by farmers. With a smaller proportion of the crop sold as harvested and the peanuts delivered to buyers over a longer period, congestion at buyers' warehouses could be reduced, and buyers could schedule their operations for more efficient and less costly use of labor and equipment.

Farmers by storing their peanuts at harvest for later sale would also have an opportunity to increase their returns by taking advantage of seasonal changes in prices. Whether peanut storage and more orderly marketing by farmers would be feasible depends on factors such as seasonal prices, availability of storage space, and need for cash during harvest months.

FACTORS IN THE FEASIBILITY OF FARM STORAGE OF PEANUTS

Farm storage has never been a major factor in peanut marketing in the United States. During and since World War II, the amount of peanut storage on farms has been negligible, the crop being delivered to buyers about as rapidly as picked and threshed.

Under the marketing situation existing in recent years, the peanut grower has felt unable to hold his crop, either for a trading profit or to earn payment for storage. Attention is often called to the fact that the grower has had little or no suitable storage space, but that may have been either a cause or a result of the absence of farm storage of peanuts. The grower typically has sold his peanuts at harvest to repay production loans and to finance family living expenses through the winter. In line with existing marketing practices, the Federal price-support program for peanuts for over a decade contained no provision for storage by farmers. During World War II the expansion of peanut production and the shortage of construction materials for farm buildings further contributed to the practice of harvest selling.

The Farmer's Storage Situation

In this study of the three peanut-producing areas, no farmers were found who had in recent years stored market stocks of peanuts for later sale. The principal reasons listed were the absence of price incentives, farmers' need for cash income at harvest time, and shortage of storage space on farms.

In the Virginia-Carolina area, growers reported they preferred harvest selling at prices near support-price levels rather than incurring storage risks and price uncertainty. In that area, peanut farmers, merchants supplying farmers, and bankers financing farmers report that most growers use receipts from peanuts--their principal cash crop--for payment of financial obligations that come due at harvest time.

In the Southwest, seasonal price increases were too small to offer farmers an incentive for storage. In the Southeast, although prices following harvest, on the average, changed about $5 to $10 per ton, most farmers preferred to sell peanuts when picked and threshed, since they needed the cash to pay off production loans.

Also, there was a general shortage of farm storage space throughout the South; and in the Southeast, the limited space available was, generally, in poor condition. The shortage of storage on farms and its poor condition is of course partly a result of not storing cash crops as well as a deterrent to storage. In the Southwest, average peanut production per farm in many communities was too small to encourage farm storage even if space were available. Even in the West Cross Timbers peanut-producing area of Texas,

however, where production averaged about 55 acres per farm, most producers reported little or no farm storage. In this area, however, ample warehouse space was available at first buyers.

Although there has been a widely held view that farm storage of peanuts cannot be carried out economically, the question frequently recurs whether storage by the growers might be feasible.

Farmers can be expected to adopt practices most favorable to net earnings, including storage, provided it regularly pays better than selling at harvest time. The important question concerns storage costs and returns. Answering that question requires consideration of many factors that might limit or prevent farm storage: the interrelationships of peanut characteristics and storage behavior, storage requirements, weight and quality losses, farmers' need for cash in the autumn, and the length of period during which a local peanut market is operating. It may or may not be convenient for the farmer to wait for the returns from his crop; and his local market may be buying for a long season or a short one.

Peanut growers can finance storage by arranging for extension of the repayment date under production loans from commercial banks or cooperative production credit associations, or under the price-support program, which in 1952 was modified to rely on producer loans and purchase agreements for support of peanut prices.

Under the Federal farm storage facility loan program, farmers can finance at low interest rates most of the construction cost for additional storage. Where investment in new storage buildings would be necessary, an income-tax advantage to the farmer could be obtained through the 5-year "rapid amortization" or "accelerated depreciation" feature of income-tax regulations. These possibilities of financing storage help to avoid one of the difficulties in farm storage--the need for cash income in the fall and the relatively high interest rates that farmers often have had to pay.

Farm or Off-Farm Storage. --An important question is whether storage costs would be lower, or storage losses smaller, for peanuts stored on farms than for those stored at commercial warehouses. Although conclusions must await more detailed data than are available here, the present data help suggest possibilities.

Fixed costs of storage must be compared on the basis of a somewhat arbitrary allocation of costs; for example, the cost of using buildings already erected must be treated in terms of usual bookkeeping charges. For existing farm storage facilities, the charge for use of storage space is mostly a bookkeeping charge, except for cash outlays for maintenance and repairs. Costs associated with past investment in any farm building are of course "sunk" costs, a part of general farm operating expense regardless of the use made of the building.

The full cost of handling the peanuts into and out of storage would be chargeable to storage for a peanut grower, while at peanut mills part of handling cost is chargeable to storage and part to milling. The only apparent way by which a grower might obtain any advantage in handling cost, compared with commercial buyers, would appear to be through using lower cost labor. For example, farmers often devote their time and labor to jobs that increase their total earnings, even though the extra income divided among hours worked may show labor earnings lower than wage rates for the same work at commercial installations. Thus, except in parts of the Southeast where the peanut harvest competes for labor with cotton harvest or other farm jobs, some peanut growers may be willing to devote time to handling farm storage of peanuts at a lower wage rate (labor cost) than would be found at shelling plants and other commercial installations.

Weight losses and grade changes in storage, for comparably rodent-proof buildings, should be no greater a problem in farm storage than for storing at commercial warehouses. In fact, farmers may be better able to control losses in storage, to the extent that the losses are associated with damage in handling or with high foreign material content of the peanuts placed in storage.

Farmers could, of course, hold their stored peanuts either in farm storage or in commercial warehouses. The location involving the lower storage costs and the smaller storage losses would be the more advantageous, not only for the growers but also for the peanut marketing industry and for consumers of peanut products.

Would Peanut Storage Pay?

The question whether peanut storage would increase returns to farmers needs to be divided into several separate questions. First, is storage available to a specific farmer or must it be built? The building of new storage, obviously, will pay a farmer only if the value added to commodities he stores year after year can be expected to equal or exceed the total of all costs, fixed and variable, connected with the venture. Once storage facilities are available, however, the decision to utilize them in any one season should depend on the question of obtaining gains in value of the stored commodity that year at least equal to all added (variable) costs. This latter decision is not concerned with the fixed cost of storage facilities. If, in a given case, the building of storage turned out to be a mistake, that still should not influence the decision to store, or not to store, based on a comparison of added costs and the value added to the stored commodity.

In addition to this distinction between variable and total costs of storage in any one season, various distinctions must be made that depend on judgment or personal evaluation by the individual farmer. Would the farmer regret spending a few hours storing and caring for peanuts, or would he welcome such an opportunity to earn wages for a few added hours of work? Would he enjoy watching market indicators and planning when to sell the peanuts from storage, or would he feel that to be an added burden for which he would need remuneration?

In the storage of any commodity some deterioration and shrinkage are to be expected. The "normal" extent of such deterioration and loss due to damage by fire or wind, for example, usually can be estimated closely enough so that the "risk" can be insured; or the farmer may be willing and able to carry the normal risk himself, absorbing the occasional losses to be expected. By better than usual care of peanuts that he stores, a farmer may reduce the risk of loss or deterioration from any cause. Likewise, however, by careless management or handling, the deterioration and shrinkage may increase. Again, while one farmer may feel able to carry the investment in stored peanuts for a few months to earn interest, another may have to pay a high rate of interest elsewhere, because he has his money tied up in the stored peanuts.

Each such decision depends on the judgment of the individual farmer; and each has an important influence on the wisdom of storage. The only way to obtain a general picture of storage costs and returns, however, is to use such "normal" figures as would result if the record for all farmers in all years were averaged for a single acre or a single ton of peanuts.

Average Seasonal Prices.--The average seasonal price pattern for each peanut type and area for the period 1946-47 through 1950-51 differed widely from the pattern for any 5-year period between the two World Wars, except 1920-21 through 1924-25. In the interwar years, seasonal price patterns for farmers' stock, cleaned, and shelled peanuts all varied somewhat together during the season, and varied greatly from year to year (tables 22 and 23, appendix).

In the postwar period (1946-47 through 1950-51) prices of cleaned and shelled peanuts showed a seasonal movement similar to prewar patterns (1920-21 through 1939-40); but prices of farmers stock did not. The technical arrangements of the Federal price-support program at that time offered growers no method of obtaining higher prices for farmers' stock late in the season than at harvest time. In 1952, the program waschanged from a sheller-loan and crusher-subsidy arrangement to a producer-loan and purchase-agreement basis. A similar program was in effect for the 1953 crop. The increase in seasonal movement of farmers' stock prices since this change, coupled with historical comparisons and comparisons with other crops, suggests that seasonal price movement

can be expected whenever competitive pricing is freely used. That will usually give below average price during peak marketing at harvest, reflecting a supply in excess of processors' and consumers' immediate requirements, and perhaps congestion of marketing facilities.

In the years since World War II, peanut prices to farmers have shown so little variation that they have offered no incentive for storage, even with storage space available at no additional (or fixed) cost. On the contrary, the 5-year average seasonal price pattern for the 1946-47 to 1950-51 crop years show that a farmer in the Virginia-Carolina area would have lost money by holding his peanuts in storage until January or later. These seasonal price patterns appear to be not typical, however, judging from patterns for individual years in the interwar period of the 1920's and 1930's, when price movements between January and April showed wide variation (tables 24-26, appendix).

For the Virginia-Carolina area and for Spanish peanuts in the Southeast, the average seasonal price patterns were comparable for the two periods 1946-47 to 1950-51 and 1920-21 to 1924-25. But for each area and peanut type the 1946-47 to 1950-51 pattern varied widely from any 5-year pattern in the late 1920's and in the 1930's. It appears reasonable to expect average seasonal price patterns under free competition to be generally comparable with those of the 1920's and 1930's. There are at least three factors which offer support to this expectation. First, a seasonal pattern, with below average prices at harvest is typical of agricultural commodities with distinct seasonal marketing patterns. Second, the change in the price-support program in 1952 from the wartime sheller-loan, crusher-subsidy[17] to the producer-loan and purchase-agreement gives opportunity for prices to rise seasonally should demand and supply warrant it. Third, during the 5-year period 1946-47 to 1950-51, under price and production control and price support, cleaned and shelled peanut prices continued to vary seasonally even though prices of farmers' stock peanuts did not (fig. 6); and during the 1920's and 1930's the two series had varied closely together seasonally.

How Well Do Stored Peanuts Keep?

The storability of picked and threshed peanuts depends to an important extent on the amount of moisture and foreign material they contain and the amount of damage that occurred before storage.

To be stored or marketed, peanuts must be picked from the vines and allowed to dry to a moisture content low enough to offer little chance of molding or rancidity and low enough to be unfavorable to insect growth and reproduction. Because freshly dug peanuts have a moisture content too high for safe storage, they are allowed to dry for 3 to 4 weeks before being picked from the vines. The bulk of the crop in the Southwest and about a third of the crop in the Southeast is cured in windrows, much like hay; and in the Virginia-Carolina area peanuts are cured largely in elevated stacks around center poles, such as can readily be laid up with a fork by a man on the ground.

Damage such as sunscalding, moisture damage, other weathering, or molding, may take place in the peanuts during the curing period and later affect their keeping qualities in storage. (2) Partial mechanization of harvesting by the use of field pickers or "combines" that separate the peanuts from the windrowed vines, would not appreciably reduce the risk of damage during curing, although it would yield some savings in picking cost. Completely mechanized harvesting, although speeding up the work, would result in the moisture-laden peanuts being picked from the vines without windrowing or stacking; this could be expected to intensify the curing problem. (7) Drying the peanuts with

[17] This is an oversimplified statement of the nature of the various peanut price-support programs, but its purpose is to generalize about the influence of broad program changes rather than to analyze the detailed mechanics of program administration and procedure. For a detailed discussion of Federal peanut programs since 1933, see Literature Cited (3).

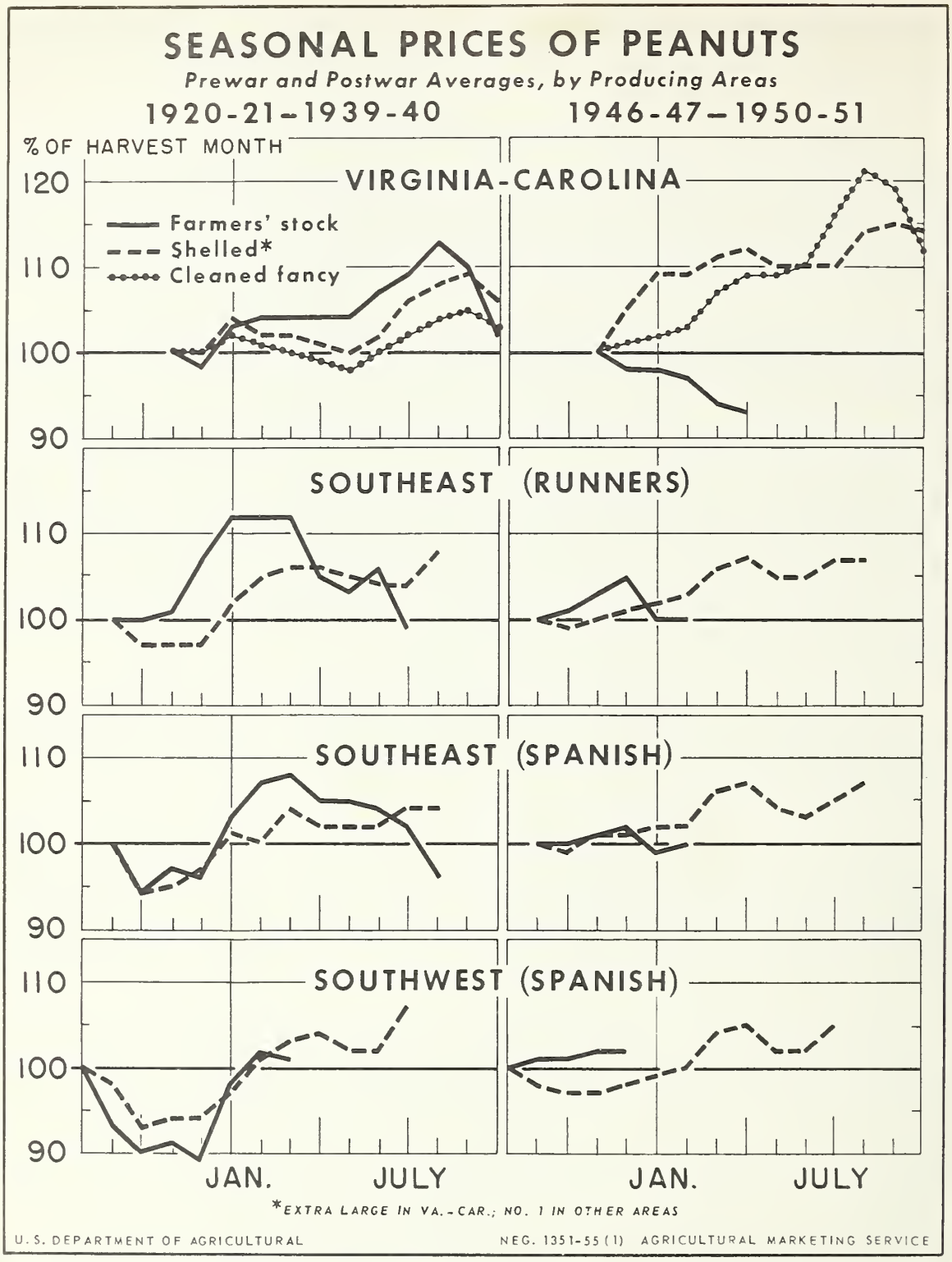

Figure 6.--Averaged for 20 pre-World War II years in each peanut area, prices for farmers' stock and shelled peanuts display similar seasonal patterns; averaged for postwar years, the price patterns show less tendency to move together. For shelled peanuts, postwar price patterns were similar to prewar for Runners and Spanish, and were even more pronounced than prewar patterns for Virginias. For farmers' stock, however, postwar seasonal patterns were unlike prewar for each peanut type.

natural or artificially-heated air offers one possible remedy, although field tests at Agricultural Experiment Stations indicate that many problems of cost and quality control remain to be solved.

Less expensive methods of curing in well-ventilated storage buildings may prove more practical for typical peanut farmers.[18] Various types of small (farm size) modern storage buildings and ventilation systems are being tested in experiments now under way in each of the principal peanut-producing areas. The most economical solution may be as simple as storing the peanuts in a slat-sided cribe of low-cost construction, made in a way to prevent sunscald, limit the entry of rain and ground moisture, and allow rapid curing by natural ventilation.

Earnings from Various Peanut Selling Schedules

With seasonal price patterns for peanuts generally comparable with those of the 1920's and 1930's, many farmers might in many years be able to increase their earnings from peanuts through storing the peanuts at harvest and carefully timing their sales, rather than selling the crop at harvest time.

Table 19 shows, for each peanut type and principal producing area, a farmer's estimated returns from various peanut selling schedules under 5-year average seasonal price patterns of the 1920's and 1930's and following World War II. These earnings are expressed as percentages of returns from selling at midharvest.

The summer months are excluded because neither farmers nor others ordinarily store many farmers' stock peanuts after May. Maintenance of quality is too difficult. The crop seasons 1940-41 and 1941-42 were omitted because price movements were distorted by unusual (wartime) conditions.

Many schematic analyses of seasonal price patterns frequently are made to derive marketing schedules that might increase the grower's return from his crop. Insofar as they are based on adequate, simple, and consistent data and principles, such analyses can serve as aids to a farmer's judgment in making marketing decisions. Although they represent only mechanical measurements of historical samples, the description often can help clarify the problem. Several such schedules are shown in table 19, but without expectation that the average price patterns would be repeated precisely--or the schedules would give the same results--in another period.

Earnings are compared from selling peanuts at early harvest, late harvest, and from storage in January, February, March, and April. These are comparisons for hypothetical peanut farmers following different selling schedules, but each of whom consistently followed one schedule for the 5 consecutive crop years. Choosing a selling schedule in this way could be expected to yield better earnings where peanut prices tend to follow the same general pattern each year than where the price patterns vary widely from one year to another.

In the latter half of the 1930's, a farmer's peanut earnings in the Virginia-Carolina area and in the Southeast could have been increased, as an average, about 10 percent over selling at harvest prices by selling from storage every year in the same month, January, February, March, or April. In the Southwest, a 7 percent increase could have been obtained by selling in February.

In the early 1930's, storage would have been of doubtful value to a peanut grower except in the Southeast, where selling Runners in February or March would have yielded

[18] The curing problem is, of course, not unique with peanuts. Before the combine harvester, small grains were field-cured in shocks. Corn is not commonly bin-stored in shelled form until after a curing period on the ear, in cribs constructed to allow the most possible ventilation while protecting the corn from much of the chance of weather damage.

TABLE 19.--Index numbers of average price of farmers' stock peanuts obtainable by growers by selected selling policies, by area, 5-year periods, 1920-21 to 1950-51[1]

[Early or general harvest = 100]

Five-year period	Basis for selling						Peak-month price between--	
	Early harvest[2]	General harvest[3]	Storage until selected month[4]				January and April	Harvest and April
			Jan.	Feb.	Mar.	Apr.		
Virginia-Carolina:								
1920-21 to 1924-25---	---	100	96	97	96	94	99	105
1925-26 to 1929-30---	104	100	109	108	105	104	113	115
1930-31 to 1934-35---	102	100	93	98	101	100	104	115
1935-36 to 1939-40---	103	100	108	108	108	109	109	111
1946-47 to 1950-51---	---	100	97	97	92	94	100	104
Southeast Runners:								
1920-21 to 1924-25---	100	100	102	108	97	87	113	116
1925-26 to 1929-30---	---	100	109	111	111	---	114	119
1930-31 to 1934-35---	---	100	105	111	121	107	125	121
1935-36 to 1939-40---	100	102	108	108	109	108	113	113
1946-47 to 1950-51---	100	101	100	---	---	---	100	105
Southeast Spanish:								
1920-21 to 1924-25---	100	---	88	83	89	87	97	112
1925-26 to 1929-30---	100	94	106	112	111	107	114	120
1930-31 to 1934-35---	100	91	97	104	110	107	115	119
1935-36 to 1939-40---	100	101	110	108	109	106	112	113
1946-47 to 1950-51---	100	100	99	100	---	---	102	103
Southwest Spanish:								
1920-21 to 1924-25---	---	100	98	104	107	---	---	---
1925-26 to 1929-30---	100	95	91	103	98	88	104	114
1930-31 to 1934-35---	100	89	73	77	81	70	84	110
1935-36 to 1939-40---	100	93	101	107	---	---	116	116
1946-47 to 1950-51---	100	101	---	---	---	---	---	102

[1] Average returns as percentage of returns from selling at harvest. Averaged from logarithms to adjust for trend and therefore somewhat less than comparable figures in table 24, appendix.

[2] October in Virginia-Carolina; September in the Southeast; August in the Southwest.

[3] November in Virginia-Carolina; October in the Southeast; September in the Southwest.

[4] Between 1920 and 1939, sales would have been made at prices below harvest in 5 of the 20 crop years in Virginia-Carolina; 4 of the 20 crop years in the Southeast, for each Runners and Spanish; and 4 of 15 crop years since 1925 in the Southwest.

average increases of 10 to 20 percent and selling Spanish in March and April would have yielded earnings of 7 to 10 percent.

In the latter half of the 1920's, increased earnings from January and February selling would have amounted to 10 percent in the Virginia-Carolina area; while for February and March sales in the Southeast, the increases would have amounted to 11 to 12 percent for both Runners and Spanish. In the Southwest, storage would have been of questionable value.

In the early 1920's, maximum returns from storage were limited to 7 to 8 percent, obtainable only in March for Southwest and in February for Runners in the Southeast.

Over the 20-year interwar period, selling in the same month between January and May for 5 consecutive years at a time, could have yielded increased returns for Southeast Runners, in every 5-year period; for Southeast Spanish, in 3 of the 4 periods; and for the Virginia-Carolina and Southwestern areas, in 2 of the 4 periods. On the other hand, losses would have amounted to less than 5 percent for all the "unprofitable" periods in Virginia-Carolina and for Spanish peanuts in the Southeast. Substantial losses would have resulted (10 to 25 percent) only in the early 1920's, for Spanish peanuts in the Southeast, and only in the early 1930's, for the Southwest.

In selling cash crops (such as peanuts or livestock), farmers can often be found who profit year after year by selling earlier in some seasons than in others; and whose selling judgment is based on one set of market factors in some seasons, a different set in others. This situation may be said to represent individual responses to market uncertainty where the amount and timing of price changes vary widely between seasons. And even though varying widely between seasons, the seasonal price patterns for peanuts show various kinds of recurring price changes or price relationships, some of which could have yielded good returns if they had been used for timing sales in the period under observation. As their intricacy increases, however, it becomes difficult to demonstrate that it would have been actually feasible to use them as guides.[19]

What Other Factors Limit Storage?

One way to make crop storage more attractive to many farmers is to make as clear as available data permit, the probable frequency and extent of losses to be borne and gains to be expected in following the plan. With such information a farmer can more intelligently decide whether the risk is one he should assume. This is an important factor influencing the orderly marketing of peanuts. Although average quantity of peanuts sold by the typical United States peanut grower is only around 5 to 10 tons, many such small growers feel unable financially to withstand even occasional storage losses of any amount, since the peanut crop is a chief source of cash with which to pay production and living expenses. Both average results, and the likelihood of an outcome different from the average, require consideration.

Whether earnings can be increased sufficiently to make farmer storage of peanuts an attractive marketing step depends, of course, on both price increases after harvest and costs of storage. Storage (and indirectly its cost) depends, in turn, on such important factors as availability of storage space, farmers' need for cash income at harvest time, and the existence of a local market throughout the storage season, and on the availability of information by which the farmer can develop objective judgments regarding these factors.

[19] No such schedules are shown here because of the impracticability of applying them with foresight to varying local price and market situations. Twelve were tested, each one based on certain manipulations of the area-average data for a specified period. Assuming enough general consistency in price trends, each could have been successful to about the same degree as the selling schedules shown in table 19.

Throughout the discussion of cost, profit, and management practices in the preceding sections of this report, it was assumed the peanuts would store without serious or rapid deterioration. In commercial storage, of course, threatened deterioration can often be discovered and is taken care of by immediate processing. The limiting factor affecting the feasibility of farm storage may well prove to be the length of time stored peanuts will retain edible-market quality and grade, and how rapidly deterioration will proceed once it commences. Seasonal price increases sufficient to cover storage cost and shrinkage would offer no incentive for storage if the peanuts deteriorated and had to be sold at a discount.

MARKET BENEFITS THROUGH IMPROVED PEANUT STORAGE

As a goal for improved practices in storing and handling farmers' stock peanuts at first buyers with the present organization of the market, an annual saving of $500,000 appears logical. About $100,000 of this saving could be achieved if all firms buying, handling, and storing farmers' stock peanuts adopted methods and practices as efficient as the average of the top one-third. Between $300,000 and $400,000 of the saving could be achieved from reducing shrinkage by as little as one-twelfth. A reduction of at least this amount would appear to be a reasonable result of adopting (1) practices and equipment that would reduce damage in handling the peanuts in and out of storage, along with (2) methods of improved rodent and insect control while peanuts are in storage. An additional $30,000 or more could be saved in storage cost--and an equal amount saved in handling cost--through improved harvesting, curing, and handling practices that would reduce foreign material content to 2 percent in the peanuts delivered to first buyers, from present levels of 4 percent or more.

This annual saving to peanut buyers and processors takes no account of possible savings through the adoption of storage as growers' marketing practice. At present the space needed for peak stocks of peanuts in storage at peanut buyers' warehouses is fully twice the seasonal average requirement. Any farm storage would reduce this peak, allowing more efficient utilization of buyers' storage.

Further, the limited information available indicates that financing storage may be more difficult for handlers and processors of peanuts than for handlers and processors of other oilseeds and of grain crops. It is also reported periodically that many peanut processors have unusual difficulty in borrowing on their stored peanuts even when warehouse receipts are offered as collateral. At present it is not possible for a peanut sheller to "hedge" the risk of price changes through central-market trading in future contracts for peanuts,[20] and commercial banks and other lenders are reported reluctant to advance money against unhedged storage stocks where the risk of loss may often be large.

To some extent the peanut processors shift price risk through sales of cleaned and shelled peanuts or other peanut products for later delivery, but they find close limits to the amount of forward sales that the market will absorb. As a peanut processor's storage holdings increase, the peanuts from which he has sold the finished products at any one time become a smaller percentage of his total holdings, and price risk can be expected to have increasing influence on the cost of financing his storage.

As the peanuts move through marketing channels between growers and consumers the storage stocks change in form, location, and size. In this process some marketing

[20] Central market trading in futures contracts for peanuts was tried with questionable success in 1938-40. During these 3 crop seasons, only 2 transactions were recorded although peanuts could be traded on both the New York Produce Exchange and the Chicago Mercantile Exchange. One reason for lack of participation in 1939-40 and 1940-41 was the outlook for gradually increasing peanut prices, based on expected increased demand for fats and oils, that accompanied the outbreak of World War II in September 1939.

problems are reduced but others are intensified. In the inventories of intermediate handlers and of the manufacturers of consumer products, peanuts usually are only one of several products handled. Thus, peak holdings and full utilization of storage space become less troublesome problems. As soon as the peanuts are shelled, however, quality maintenance becomes a more serious problem.

Whether or not made up in consumer products, shelled peanuts are perishable and require handling, packing, and storing much like fresh fruits and vegetables. Because of this fact, stocks of shelled peanuts are largely concentrated in refrigerated storage as the warm spring months approach. Because of the higher cost, among other factors, stocks held in cold storage tend to be limited, pushing peanut storage back to the shellers and other dealers who buy and store the peanuts as farmers' stock. Thus, problems of storage costs and losses are important aspects of the profit-and-loss situation for peanut shellers and other dealers.

By careful management of storage practices, shellers and other dealers can reduce peanut storage costs and losses. Through careful selection and operation of equipment, they can reduce both cost of handling and loss or damage in handling. They can reduce shrinkage and quality losses during storage by storing only peanuts with low foreign material and moisture content, controlling insects and rodents, and shelling or shipping the peanuts before hot weather.

In the hands of shellers and other dealers, peanuts can be stored and handled like grain. The warm-weather deterioration problem, largely rancidity and insect damage, increases the seasonality of dealers' shelling and shipping operations, and results in lower utilization of warehouse space.

By efficient use of their equipment, labor, and storage facilities, shellers and other dealers can further reduce storage costs. The adoption of farm storage would, by spreading farmers' sales over a longer period, reduce the peak volume marketed at harvest time and perhaps reduce peak stocks. This fact should be considered not only for reducing costs at existing warehouses but also in selecting the capacity needed where additional warehouses are to be constructed.

To the extent that peanut shellers and crushers seek to avoid price risk or to reduce the need to borrow against storage stocks, by limiting their purchases during the harvest-time movement of the crop, the ownership of storage stocks must be held by warehousemen or farmers. They, in turn, can be expected to furnish the marketing service of storage, provided it pays.

In any case, the peanuts must be stored. The problem in terms of marketing cost is to store them where the function can be performed most economically. For farmers to store their peanut crops the operation must offer opportunity for increased earnings, compared with selling as soon as harvested. Such an opportunity may exist for peanut growers in some circumstances but not in others. Where it exists its utilization would be of advantage to the peanut grower and could help to lower the cost of marketing.

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APPENDIX

Method of Study

Main sources of data utilized in this study of practices and costs in peanut storage include: (1) Industry data, compiled and summarized by the Texas, Alabama, and Virginia Agricultural Experiment Stations, and obtained through both field and mail surveys under research contracts; (2) published and unpublished data available from USDA sources; and (3) published research studies of the State agricultural and engineering experiment stations in the major peanut areas.

All known buyers of farmers' stock peanuts were contacted either by field interview or mail survey. Sixty representative firms (in each area, a judgment sample of 20 firms, selected by the contractor) were interviewed for the detailed survey; the remaining firms were surveyed by mail. In the mail survey, the mailing and followup were handled for the Southeast by the Alabama Agricultural Experiment Station; for the Southwest and Virginia-Carolina areas, by the former Research Division, Fats and Oils Branch, Production and Marketing Administration.

Data regarding the types, number, capacity, construction, and condition of their storage warehouses were surveyed for all firms. The proportion of buyers responding and their distribution by area and type of firm were considered generally adequate for representativeness of the data both for the industry as a whole and for the three major areas. The 60 representative firms contacted under the field interviews were surveyed further for handling equipment and methods, volume handled, use of storage, and length of operating season, and, for the firms in the Southeast and Southwest, costs in detail. Farmer cooperative peanut marketing associations in the Southeast and Southwest furnished data for three consecutive crop seasons on weight and grade factors of peanuts loaded in and loaded out of all member warehouses.

Responses with usable data from both survey methods totaled 186--92 from shellers and crushers; 94 "other" buyers, representing an estimated 50 percent and 55 percent, respectively, of total firms in all 3 areas. Within areas, responding firms as a proportion of all firms amounted to, for shellers and crushers, about one-third in the Southwest, one-half in Virginia-Carolina, and three-fifths in the Southeast; for "other" dealers, about three-eighths in the Southwest, nearly half in Virginia-Carolina, and an estimated two-thirds in the Southeast.

"Other" buyers store peanuts that were bought either for sale to shellers or crushers or for the account of a particular sheller or crusher. The data for "other" buyers may be somewhat less representative of typical industry conditions than those for shellers and crushers. The assembly and storage of peanuts may, for some of the "other" buyers, be operated as a sideline to various other principal enterprises, and can be added to a firm's other enterprises, or the scale of operation expanded or curtailed, much more readily than the shelling or crushing of peanuts.

The data were tabulated and summarized for the Southeast and Southwest by the contractors, with special tabulations of storage use and cost by type of dealer, for the Southwest, and handling cost by equipment and method for the Southeast. The survey data for the Virginia-Carolina area were tabulated and summarized, and all data pertaining to shrinkage and grade changes during storage analyzed in detail, by the authors.

The analysis of cold storage costs was based on published rate schedules furnished by 16 firms operating public general cold-storage warehouses. Charges for handling and storing cleaned and shelled peanuts were obtained for cold-storage warehouses at 29 locations in the 3 peanut milling and all peanut-consuming areas.

Published and unpublished data from USDA sources were compiled and analyzed with respect to (1) patterns of seasonal prices for farmers' stock, cleaned, and shelled peanuts; (2) volume of storage by peanut type, form, area, and market level, and (3) storage losses for all first buyers, by area. Supplementary data on factors affecting the

storability and storage behavior of peanuts were obtained from published research at agricultural and engineering experiment stations in the peanut-growing states. The above data were used in making the analysis of the feasibility of farm storage, and where appropriate to supplement the data obtained under contract in analyzing adequacy and use of storage and storage losses. Other data on various aspects of peanut market supply, utilization, stocks, shipments, and millings were obtained from USDA Agricultural Statistics (annual); Farm Production, Disposition and Value of Principal Field Crops by States (annual); Peanut Stocks and Processing (monthly); and Reports of Fresh Fruits and Vegetables Unloads at Principal Markets (monthly and annual summary).

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Table 26. ---------- Index numbers of prices paid to farmers for peanuts, by months, Southwest, 1920-21 through 1950-51

TABLE 20.--Storage capacity for farmers' stock peanuts at reporting first buyers, and estimates for all first buyers, by area, 1951

Type of firm	Survey response				Area estimate			
	Firms	Capacity			Firms[1]	Capacity		
		Total	Percentage of total	Average		Total	Percentage of total	Average
	Number	*Tons*	*Percent*	*Tons*	*Number*	*Tons*	*Percent*	*Tons*
Virginia-Carolina:								
Shellers	15	[2] 71,400	67.8	4,427	33	[2] 150,310	68.1	4,300
Crushers	3	7,850	7.5	2,617	5	13,080	5.9	
Other	15	[3] 26,060	24.7	1,737	33	[4] 57,340	26.0	1,738
Total	33	[2] [4] 105,310	100.0	3,040	71	[4] 220,730	100.0	
Southeast:								
Shellers, Crushers	56	[5] 266,450	50.5	4,758	94	459,020	56.7	4,883
Other	55	[5] 261,690	49.5	4,758	76	349,840	43.3	4,603
Total	111	528,140	100.0	4,758	170	808,860	100.0	
Southwest:								
Shellers	12	31,920	63.1	2,660	36	95,760	47.0	2,685
Crushers	3	8,280	16.4	2,760	12	33,120	16.3	
Other	9	10,350	20.5	1,150	65	74,750	36.7	1,150
Total	24	50,550	100.0	2,106	113	203,630	100.0	

[1] Shellers and crushers from USDA and Census data; other dealers estimated.
[2] Includes about 5,000 tons silos.
[3] Includes 3,000 tons at tobacco warehouses.
[4] Includes 7,000 tons at tobacco warehouses.
[5] Apportioned by number of respondents; data on capacity by type of firm not available.

TABLE 21.--Farmers' stock peanuts: Commercial supply, distribution, and estimated losses in storing and handling, by areas, 1947-48 to 1951-52

Area and year	Supply			Distribution				Loss in storage and handling	
	Beginning stocks[1]	Farmers' sales	Total	Milled[2]	Ending stocks[3]	Seed sales	Total	Actual[4]	Percentage of supply
	Million pounds	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Million pounds*	*Percent*
Virginia-Carolina:									
1947-48	14.4	464.7	479.1	438.6	20.6	8.1	467.3	11.8	2.5
1948-49	20.6	554.0	574.6	556.2	10.0	6.6	572.8	1.8	.3
1949-50	10.0	410.0	420.0	393.6	8.6	8.5	410.7	9.3	2.2
1950-51	8.6	455.4	464.0	407.3	38.7	10.7	456.7	7.3	1.6
1951-52	38.7	536.1	574.8	442.8	115.8	8.5	567.2	7.6	1.3
Southeast:									
1947-48	10.2	1,058.2	1,068.4	948.0	7.7	53.2	1,008.9	59.5	5.6
1948-49	7.7	1,201.6	1,209.3	1,111.9	6.6	42.5	1,161.0	48.3	4.0
1949-50	6.6	909.2	915.8	808.9	6.9	56.4	872.2	43.6	4.8
1950-51	6.9	1,035.5	1,042.4	919.8	13.1	62.1	995.0	47.4	4.6
1951-52	13.1	834.7	847.8	694.4	63.8	55.3	813.5	34.3	4.0
Southwest:									
1947-48	4.9	478.8	483.7	414.6	10.3	35.0	459.9	23.8	4.9
1948-49	10.3	438.3	448.6	382.6	10.5	24.5	417.6	31.0	6.9
1949-50	10.5	429.5	440.0	394.8	1.6	29.5	425.9	14.1	3.2
1950-51	1.6	444.0	445.6	378.9	12.4	33.9	425.2	20.4	4.6
1951-52	12.4	229.7	242.1	185.2	12.7	24.0	221.9	20.2	8.3

[1] September 1.
[2] September through following August.
[3] August 31.
[4] Difference between reported supply and distribution.

Production and farmers' sales: 1947-49 from USDA Stat. Bul. 115; 1950 Virginia-Carolina: unpublished revised stocks and processing data, USDA, BAE; 1950 for other areas and 1951: USDA Production Disposition and Value of Principal Field Crops by States (annually).
Seed sales: Calculated from data on farm disposition in above sources.
Stocks and millings: USDA Peanut Stocks and Processing Reports.

TABLE 22.--Index numbers of prices paid to farmers for peanuts, by areas and by months, averages for selected periods 1920-21 to 1950-51[1]

[Harvest month = 100]

Area, type, and period	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
Virginia-Carolina:															
1920-21 to 1924-25	--	--	--	100	92	97	99	97	96	97	100	103	103	99	97
1925-26 to 1929-30	--	--	--	100	105	110	110	107	105	105	111	114	113	105	103
1930-31 to 1934-35	--	--	--	100	91	95	99	104	103	106	106	116	116	122	101
1935-36 to 1939-40	--	--	--	100	103	109	109	108	110	109	110	117	120	114	104
1920-21 to 1939-40	--	--	--	100	98	103	104	104	104	104	107	109	113	110	102
1946-47 to 1950-51	--	--	--	100	98	98	97	94	93	--	--	--	--	--	--
Southeast Runners:															
1920-21 to 1924-25	--	--	100	100	93	102	109	101	93	94	80	92	87	--	--
1925-26 to 1929-30	--	--	100	101	104	110	115	116	--	--	--	--	--	--	--
1930-31 to 1934-35	--	--	100	100	99	107	117	123	108	120	128	99	--	--	--
1935-36 to 1939-40	--	100	101	103	107	109	108	110	110	104	103	104	105	--	--
1920-21 to 1939-40	--	100	100	101	107	112	112	112	105	103	106	99	--	--	--
1946-47 to 1950-51	--	100	101	103	105	100	100	--	--	--	--	--	--	--	--
Southeast Spanish:															
1920-21 to 1924-25	--	100	83	92	85	91	97	96	94	94	97	92	92	--	--
1925-26 to 1929-30	--	100	94	102	105	108	114	112	108	104	106	104	98	--	--
1930-31 to 1934-35	--	100	91	92	88	101	109	115	111	116	113	108	114	--	--
1935-36 to 1939-40	--	100	101	103	107	111	109	110	107	104	101	103	99	--	--
1920-21 to 1939-40	--	100	94	97	96	103	107	108	105	105	104	102	96	--	--
1946-47 to 1950-51	--	100	100	101	102	99	100	106	--	--	--	--	--	--	--
Southwest:															
1920-21 to 1924-25	--	100	100	102	98	102	109	114	--	--	--	--	--	--	--
1925-26 to 1929-30	100	96	91	91	94	101	103	101	91	71	--	--	--	--	--
1930-31 to 1934-35	100	90	76	75	71	81	85	90	77	79	--	--	--	--	--
1935-36 to 1939-40	100	93	96	96	94	103	109	104	--	--	--	--	--	--	--
1920-21 to 1939-40	100	93	90	91	89	98	102	101	84	--	--	--	--	--	--
1946-47 to 1950-51	100	101	101	102	102	--	--	--	--	--	--	--	--	--	--

[1] Averaged from natural numbers and therefore somewhat larger than comparable figures in Table 19.

TABLE 23.--Index numbers of prices for principal grades of cleaned and shelled peanuts by areas and by months, averages for selected periods, 1920-21 to 1950-51

[Harvest month = 100]

Area, type, and period	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
Virginia-Carolina:															
Cleaned fancy															
1920-21 to 1924-25	--	--	--	100	99	104	105	103	100	100	101	100	102	99	98
1925-26 to 1929-30	--	--	--	100	101	102	102	101	99	96	98	100	99	101	100
1930-31 to 1934-35	--	--	--	100	97	101	98	101	100	100	99	100	108	113	113
1935-36 to 1939-40	--	--	--	100	103	102	100	97	96	96	101	106	107	108	102
1920-21 to 1939-40	--	--	--	100	100	102	101	100	99	98	100	102	104	105	103
1946-47 to 1950-51	--	--	--	100	101	102	103	107	109	109	110	116	121	119	112
Shelled extra large															
1920-21 to 1924-25	--	--	--	100	98	107	106	105	103	100	101	102	104	102	100
1925-26 to 1929-30	--	--	--	100	100	102	101	100	99	97	99	102	104	109	107
1930-31 to 1934-35	--	--	---	100	95	96	94	97	97	100	98	100	103	106	106
1935-36 to 1939-40	--	--	--	100	107	110	107	105	104	105	110	118	121	120	111
1920-21 to 1939-40	--	--	--	100	100	104	102	102	101	100	102	106	108	109	106
1946-47 to 1950-51	--	--	--	100	105	109	109	111	112	110	110	110	114	115	114
Southeast Runners:															
Shelled No. 1															
1920-21 to 1924-25	--	100	95	96	90	97	100	99	100	97	101	102	110	--	--
1925-26 to 1929-30	--	100	97	97	101	104	108	108	107	103	102	104	101	--	--
1930-31 to 1934-35	--	100	94	94	93	102	107	112	112	116	113	105	121	--	--
1935-36 to 1939-40	--	100	100	99	105	105	103	105	105	103	101	105	101	--	--
1920-21 to 1939-40	--	100	97	97	97	102	105	106	106	105	104	104	108	--	--
1946-47 to 1950-51	--	100	99	100	101	102	103	106	107	105	105	107	107	--	--
Southeast Spanish:															
Shelled No. 1															
1920-21 to 1924-25	--	100	90	92	88	92	97	96	95	96	99	102	105	--	--
1925-26 to 1929-30	--	100	94	97	100	105	107	107	103	102	103	102	102	--	--
1930-31 to 1934-35	--	100	91	93	93	101	106	112	111	114	111	112	114	--	--
1935-36 to 1939-40	--	100	99	100	105	106	105	104	101	98	95	99	96	--	--

TABLE 23.--Index numbers of prices for principal grades of cleaned and shelled peanuts by areas and by months, averages for selected periods, 1920-21 to 1950-51--Continued

[Harvest month = 100]

Area, type, and period	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
Southeast Spanish--Continued															
Shelled No. 1															
1920-21 to 1939-40-------	--	100	94	95	97	101	100	104	102	102	102	104	104	--	--
1946-47 to 1950-51-------	--	100	99	101	101	102	102	106	107	104	103	105	107	--	--
Southwest Spanish:															
Shelled No. 1															
1920-21 to 1924-25-------	100	96	89	93	87	90	96	94	97	97	87	104	--	--	--
1925-26 to 1929-30-------	100	94	89	89	92	94	99	98	97	95	98	97	--	--	--
1930-31 to 1934-35-------	100	103	97	95	94	100	108	117	120	120	121	121	--	--	--
1935-36 to 1939-40-------	100	97	97	98	102	102	103	103	103	95	98	104	--	--	--
1920-21 to 1939-40-------	100	98	93	94	94	97	101	103	104	102	102	107	--	--	--
1946-47 to 1950-51-------	100	98	97	97	98	99	100	104	105	102	102	105	--	--	--

TABLE 24.--Index numbers of prices paid to farmers for peanuts, Virginia-Carolina, by months, 1920-21 to 1950-51

[Harvest month = 100]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
1920-21	--	100	90	100	100	100	100	105	126	126	126	121	--
1921-22	--	100	82	76	74	71	63	58	58	63	68	71	--
1922-23	--	100	109	118	114	112	112	114	109	102	91	91	--
1923-24	--	100	98	103	107	105	110	112	115	135	145	138	127
1924-25	96	100	81	89	98	98	96	94	93	87	83	74	66
1925-26	109	100	94	103	112	109	109	109	125	131	128	119	119
1926-27	119	100	100	112	119	122	122	118	125	144	147	--	--
1927-28	106	100	132	135	126	121	124	124	129	124	112	100	91
1928-29	82	100	103	108	110	105	95	92	92	87	90	90	87
1929-30	111	100	96	90	80	77	77	80	84	84	87	110	104
1930-31	109	100	86	96	110	103	111	111	114	114	107	100	64
1931-32	120	100	93	80	80	86	73	66	66	66	86	100	86
1932-33	93	100	65	65	65	65	71	100	107	157	150	150	135
1933-34	91	100	105	115	120	129	129	129	129	129	134	143	120
1934-35	100	100	108	120	132	140	132	124	116	116	104	116	100
1935-36	100	100	92	92	96	92	96	104	120	140	140	136	128
1936-37	114	100	114	136	136	136	143	132	121	125	114	100	89
1937-38	96	100	100	104	100	104	104	100	104	115	123	111	96
1938-39	96	100	111	111	111	108	108	108	104	108	119	123	115
1939-40	109	100	100	103	103	100	100	103	100	100	103	100	93
1940-41	100	100	96	98	104	108	111	119	150	158	162	158	146
1941-42	100	100	108	124	134	153	155	142	124	142	158	--	--
1942-43	95	100	111	111	121	123	123	--	--	--	--	--	--
1943-44	99	100	101	106	107	106	106	106	106	107	107	--	--
1944-45	--	100	101	101	102	98	94	102	103	103	--	--	--
1945-46	--	100	102	102	101	101	101	101	101	101	--	--	--
1946-47	98	100	89	86	89	91	95	--	--	--	--	--	--
1947-48	--	100	100	100	100	100	100	--	--	--	--	--	--
1948-49	--	100	98	98	97	--	--	--	--	--	--	--	--
1949-50	--	100	102	104	107	--	--	--	--	--	--	--	--
1950-51	--	100	102	100	92	92	85	88	88	85	--	--	--

TABLE 25.--Index numbers of prices paid to farmers for peanuts, Southeast, by months, 1920-21 to 1950-51

[Harvest month = 100]

Type of peanut and year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
Runner:												
1920-21	--	100	95	82	91	82	64	54	59	64	68	82
1921-22	--	--	100	100	104	127	146	136	136	--	--	--
1922-23	--	--	100	97	121	133	--	--	--	--	--	--
1923-24	--	--	100	96	104	102	96	88	--	81	108	--
1924-25	--	100	103	91	91	103	100	91	86	94	100	91
1925-26	--	100	100	97	110	127	127	117	--	--	--	--
1926-27	--	--	100	98	114	129	--	--	--	--	--	--
1927-28	--	100	107	129	132	125	129	--	--	--	--	--
1928-29	--	--	100	109	103	106	91	--	74	--	--	--
1929-30	--	100	100	91	91	91	--	--	--	--	--	--
1930-31	--	100	96	--	--	--	--	--	--	--	--	--
1931-32	--	100	110	100	80	80	100	90	80	60	80	--
1932-33	--	100	91	73	100	100	109	118	164	182	--	--
1933-34	--	100	100	100	113	117	122	117	117	117	117	117
1934-35	--	100	104	123	135	169	162	--	--	154	--	--
1935-36	100	104	104	104	104	104	100	104	108	104	127	131
1936-37	100	96	104	126	137	133	144	156	137	130	111	104
1937-38	--	100	104	100	100	100	104	89	89	96	100	--
1938-39	100	104	104	104	104	104	100	96	93	96	96	100
1939-40	100	104	100	100	100	100	104	104	93	89	86	86
1940-41	100	104	104	107	107	111	111	118	122	126	137	144
1941-42	100	103	108	113	113	128	177	179	172	138	141	154
1942-43	100	111	114	130	135	135	135	135	135	--	--	--
1943-44	--	100	100	100	100	100	100	100	100	102	102	102
1944-45	--	100	104	107	105	99	101	97	104	105	108	--
1945-46	--	100	100	100	100	100	100	100	100	100	100	--
1946-47	100	107	114	122	--	--	--	--	--	--	--	--
1947-48	100	100	100	100	100	100	--	--	--	--	--	--
1948-49	100	100	101	100	100	--	--	--	--	--	--	--
1949-50	100	100	101	100	100	100	--	--	--	--	--	--
1950-51	100	100	101	103	--	--	--	--	--	--	--	--

TABLE 25.--Index numbers of prices paid to farmers for peanuts, Southeast, by months, 1920-21 to 1950-51--Continued

Type of peanut and year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
Spanish:												
1920-21	100	81	77	50	56	54	42	42	40	38	35	42
1921-22	--	--	100	89	93	107	125	118	121	139	164	157
1922-23	--	--	100	106	121	136	132	140	147	151	--	--
1923-24	--	--	100	94	100	101	97	91	86	86	97	101
1924-25	100	85	85	85	85	88	85	81	77	73	73	69
1925-26	100	90	90	85	100	122	120	117	115	130	132	138
1926-27	100	88	100	104	113	127	131	129	119	112	112	77
1927-28	100	100	108	128	128	119	114	111	106	111	100	94
1928-29	100	100	119	122	122	117	106	100	100	97	89	89
1929-30	100	94	94	88	76	82	91	85	82	82	88	94
1930-31	100	89	86	78	83	94	94	100	100	97	89	78
1931-32	100	80	80	80	80	80	93	80	67	53	53	87
1932-33	100	82	76	65	76	76	82	94	135	153	171	171
1933-34	100	108	112	112	125	121	123	117	117	121	121	121
1934-35	100	97	107	107	140	173	183	163	160	140	107	--
1935-36	100	94	94	94	88	88	92	94	97	97	109	106
1936-37	100	94	97	118	135	132	138	135	126	109	109	91
1937-38	100	110	117	114	117	117	117	107	107	110	110	107
1938-39	100	103	103	106	106	103	100	100	97	100	100	103
1939-40	100	106	103	103	109	106	103	100	94	88	85	88
1940-41	100	100	100	100	103	109	116	116	119	122	131	137
1941-42	100	100	111	120	120	138	178	182	167	142	144	144
1942-43	100	109	114	131	134	133	132	132	132	132	--	--
1943-44	100	100	100	100	100	100	100	100	100	100	100	100
1944-45	100	102	104	104	106	102	101	100	102	98	98	--
1945-46	100	100	100	100	100	100	100	100	100	100	100	100
1946-47	100	103	107	112	100	102	106	110	112	--	--	--
1947-48	100	100	100	100	100	100	--	--	--	--	--	--
1948-49	100	100	100	99	96	98	--	--	--	--	--	--
1949-50	100	101	100	100	101	101	--	--	--	--	--	--
1950-51	100	98	98	99	--	--	--	--	--	--	--	--

TABLE 26.--Index numbers of prices paid to farmers for peanuts, Southwest, by months, 1920-21 to 1950-51

[Harvest month = 100]

Year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
1920-21	--	--	--	100	77	71	74	77	--	77	--	--
1921-22	--	100	--	86	86	86	89	--	--	--	--	--
1922-23	--	100	--	122	133	161	183	189	--	--	--	--
1923-24	--	--	--	100	89	94	94	92	86	--	--	--
1924-25	--	--	100	102	107	100	107	100	--	--	--	--
1925-26	--	--	100	103	100	115	127	130	--	--	--	--
1926-27	--	100	86	88	92	104	114	114	116	--	--	--
1927-28	100	82	81	82	100	112	100	98	98	98	98	--
1928-29	--	100	100	100	106	112	109	--	--	--	112	--
1929-30	--	100	89	80	71	63	66	63	60	60	--	--
1930-31	100	92	82	78	62	--	78	78	--	--	--	--
1931-32	100	64	50	57	50	39	36	36	36	32	32	--
1932-33	100	90	58	58	47	58	68	79	84	--	--	147
1933-34	100	100	93	89	89	107	111	111	111	111	--	--
1934-35	100	103	97	94	106	119	132	145	--	--	--	126
1935-36	100	100	100	100	79	76	86	93	114	110	--	--
1936-37	100	85	85	88	100	124	138	--	138	--	--	--
1937-38	100	93	103	103	100	103	100	114	--	114	--	114
1938-39	100	93	96	96	100	107	107	--	--	--	--	118
1939-40	100	94	97	94	91	103	112	--	--	--	--	97
1940-41	100	104	104	104	104	104	111	133	133	137	137	--
1941-42	100	100	100	100	107	107	--	--	--	--	--	--
1942-43	100	98	104	106	110	114	117	122	122	128	--	--
1943-44	--	--	100	96	96	92	92	87	87	89	92	93
1944-45	--	--	100	100	102	102	101	102	100	100	--	--
1945-46	--	--	100	100	100	100	100	100	100	100	--	--
1946-47	100	100	100	100	100	--	--	--	--	--	--	--
1947-48	100	100	100	100	100	--	--	--	--	--	--	--
1948-49	100	102	101	103	103	--	--	--	--	--	--	--
1949-50	100	101	102	104	106	105	102	--	--	--	--	--
1950-51	100	101	101	101	100	--	--	--	--	--	--	--

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